



Get Great Graphics

PC Labs Tests 17 Color Flatbed Scanners
And 6 Inexpensive Digital Cameras

NETWORK EDITION

IP Addresses

3 Programs That
Automate Tracking
And Assigning

Encyclopedias

5 New CD-ROMs
That Blow Away
The Paper Versions



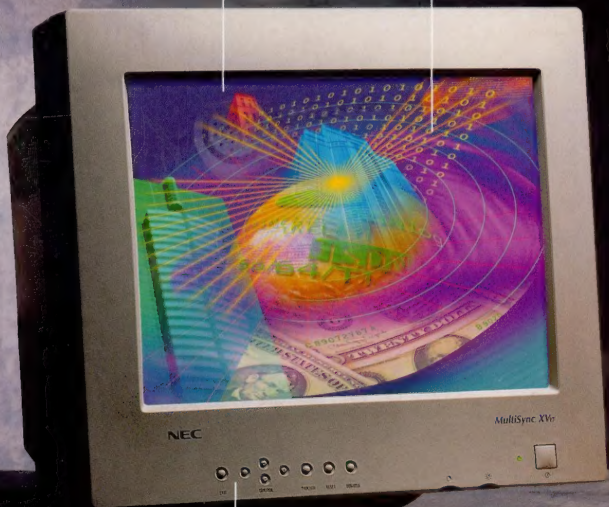
16 HTML Editors and
16 Graphics Tools to Help You Create
Stunning Personal Web Pages

"...bright screen, superior on-screen controls and low price."

Windows*

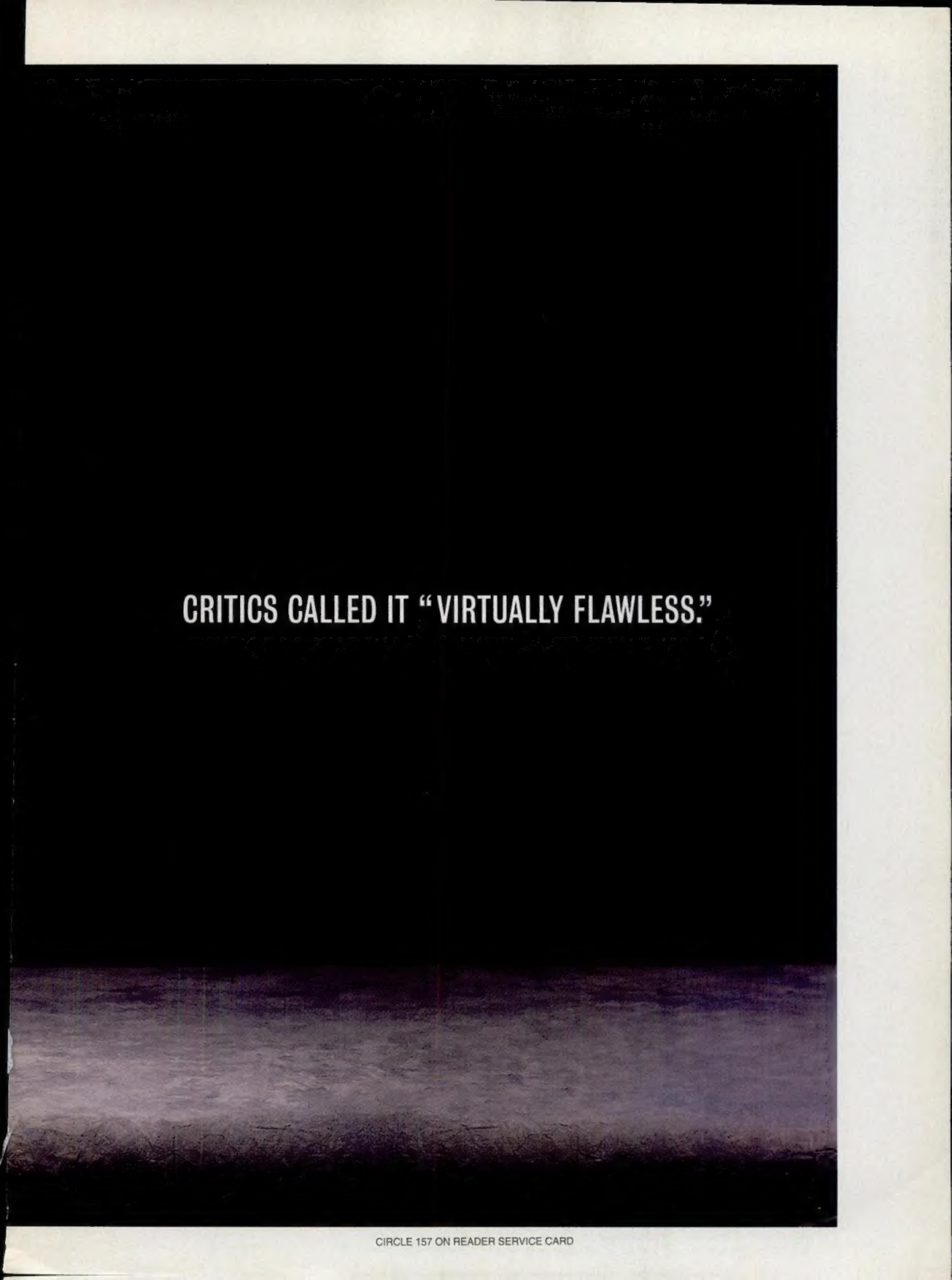
"... great picture quality, advanced features, and top-notch support... a superb monitor."

FamilyPC**

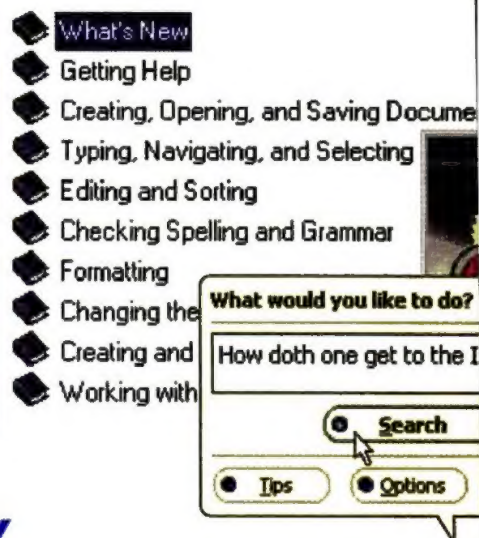


MacUser†

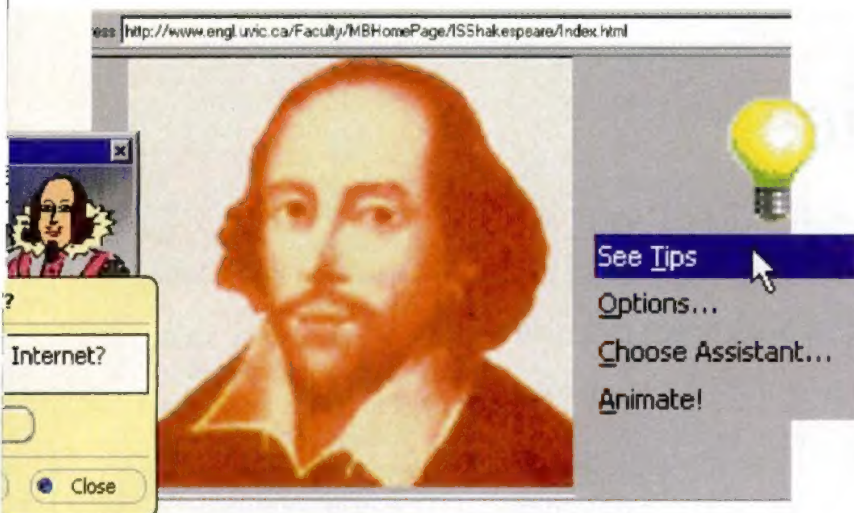
"A tremendous bargain, with great, easy-to-use controls."



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Microsoft Office 97/now/
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pose your question to



espeare, the little animated dog.

His name is Power Pup, and he's one of the [Office Assistants](#), your personal guides to [new Microsoft® Office 97](#). Office Assistants are designed to help you do things in fewer steps, with better results and less frustration. For instance, if Power Pup sees a shortcut to what you're doing, he'll suggest it. He'll walk you through tasks you need help completing. And you can ask him questions in plain English. There are nine Office Assistants, including the aforementioned bard and pup, a Hoverbot and a sarcastic, slightly bent paper clip. You can [customize your helper](#) to offer as much or as little help as you'd like—or you can turn him, her or it off. Microsoft Office 97 has lots of other [intelligent improvements](#), like the overall webbiness, or the automatic correction of formula mistakes in [Microsoft Excel](#). But what may prove invaluable to your mental well-being is that goofy-looking dog. To find out more about the little critters, visit our Web site.

Office Politics



Last month, I watched as hundreds of people gathered in Alice Tully Hall at Lincoln Center in New York to see Bill Gates and his crew formally introduce Microsoft Office 97. It was a big, fancy event—just right for a big, sophisticated application. On my way there, I stopped off at a small press conference across town, where

executives of Corel Corp. were quietly mapping out their strategy for competing with Microsoft Office at a time specifically chosen to compete with the Microsoft introduction. They were gathered in a small meeting room in a respectable but plain hotel, and that too seemed appropriate for the product at hand. The contrast between the two events—and the two products—stands out because it emphasizes two different approaches to the one of the oldest questions in the PC software industry.

Today, Microsoft Office 97 supports just 32-bit Windows (95 and NT), with plans for moving it to the Macintosh. And that's about all. Office itself is made up of lots of little components, such as toolbars, a spell-checker, and a drawing engine, many of which are shared among the individual applications. In addition to keeping up with features such as better Internet tools, more collaboration tools, and a new help system, the emphases in this version of Office are on greater consistency among the applications and a better way of tying all the applications together through a common version of Visual Basic. Thus, Office begins to look less like individual applications and more like one big application that does everything.

Corel has a different implementation. With its WordPerfect Suite and its higher-end Corel Office Professional, Corel goes head to head with Lotus and Microsoft in the 32-bit Windows world. Corel's products arguably offer a greater variety of components for less money, but to date, the components don't show the level of integration or consistency that Microsoft's do—a reflection of the components' different heritages. Corel has promised to address this in new versions planned for this summer.

But perhaps because Corel is coming from behind, it seems more willing to try different things. Unlike Microsoft, which still offers its Windows 3.x version of Office

but has no plans to update it, Corel is still working on new versions of WordPerfect Suite for Windows 3.1 as well as WordPerfect Suite for DOS.

That same flexibility has led Corel to be one of the earliest, most visible supporters of Java, the cross-platform solution developed by Sun Microsystems. The idea behind Java is simple: You write Java code once, and if everyone is following the

right specifications, it runs on every Java platform. And since Java virtual machines are now part of IBM's OS/2, Microsoft Internet Explorer, and Netscape Navigator, and will eventually be part of the Mac OS, "every Java platform" pretty much means all modern computers. As JavaSoft likes to say, "write once, run everywhere."

For months now, Corel has been showing early versions of Corel Office for Java on its Web site, and the product is close to becoming a reality. It's nowhere near as full-featured as the Windows versions, but the basic functionality is there. Recently, Corel even agreed to work with Netscape to create a consistent user interface for applications.

You'll hear Corel (and Lotus, with its Components product) talk about how Java promotes different components instead of big monolithic applications under Windows. But that's misleading. Today's Windows programs, including Office 97, are really collections of components as well. I suspect that most end users will continue to want to buy applications, not components—although they will like the ability to get small updates more frequently over the Internet.

So why Java? Partly because it's new, sexy, Internet-related, and cross-platform. But more important, because if Java can gather developer and user support, then Corel, Lotus, Netscape, and Sun will have successfully created an alternative to Microsoft-controlled platforms. And that's why the Office battle is just a prelude to the coming Java/Windows war.

A stylized, handwritten signature of Michael J. Miller in black ink.

MICHAEL J. MILLER



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APPLE AT&T COMPAQ DIGITAL HEWLETT-PACKARD	AT&T DIGITAL	DIGITAL HEWLETT-PACKARD
FAIR	FAIR	FAIR
GATEWAY 2000 IBM QUANTEX	GATEWAY 2000 IBM NEC	ACER APPLE AT&T COMPAQ GATEWAY 2000 IBM MIDWEST MICRO QUANTEX

PC World Reliability & Service Survey—*PC World*, December 1996



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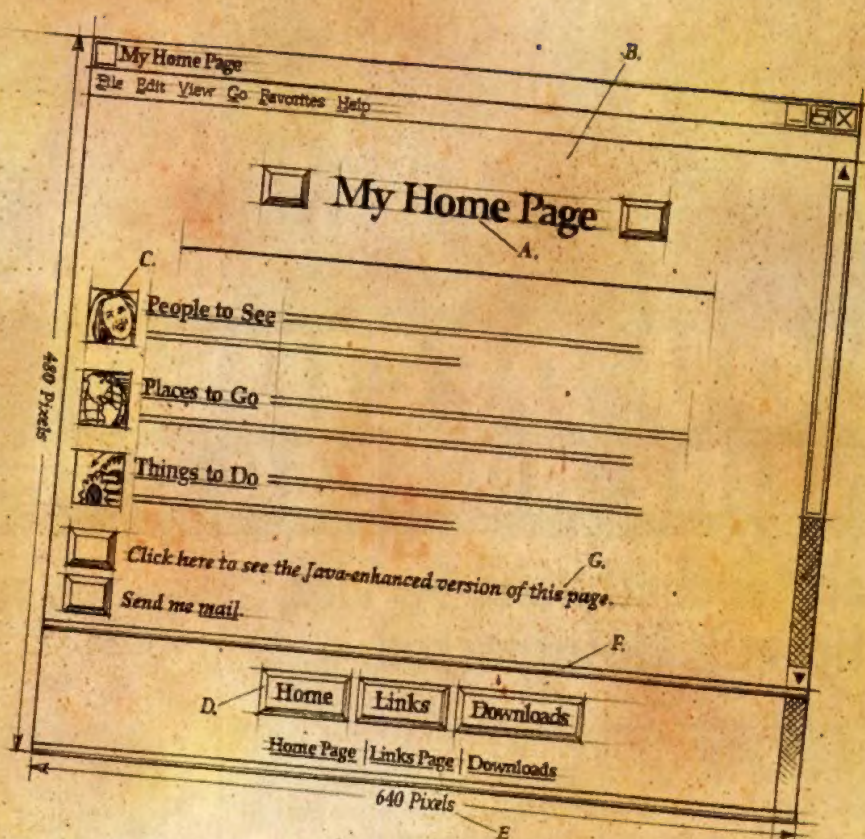
COVER STORY

PERSONAL WEB-PAGE EDITORS

Grand Designs

BY EDWARD MENDELSON

Creating Web pages used to mean typing line after line of HTML code, then hoping the finished pages looked close to what you had in mind. With today's Web tools, you don't have to think in code. We review ten personal Web-page editors that display your pages graphically and allow anyone to design elaborate pages in a snap. We also look at traditional text-based HTML editors, high-end Web development tools, and an HTML editor that may already be on your desktop: your word processor100



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ONLINE



What's New Online

Personal Pages

Join us at www.pcmag.com to see the winners of our

Personal Web Page contest. From hundreds of submissions, we've selected ten winners who ably demonstrated their talents in using the kinds of Web-page design tools reviewed in this issue's cover story.

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Capture The Color

BY M. DAVID STONE

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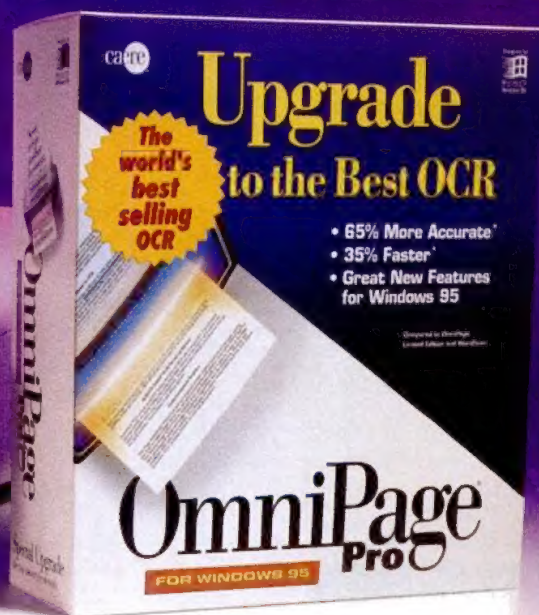
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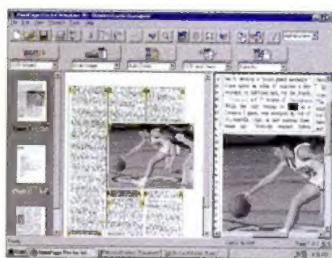
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Pipeline

BeOS Makes a Splash

While Apple's purchase of Steve Jobs' company, NeXT Software, was making front-page news at the recent MacWorld trade show in San Francisco, Be Inc., founded by ex-Apple executive Jean-Louis Gasse, was busy grabbing headlines of its own.

The young BeOS—running on new multi-processor PowerPC systems from Apple, DayStar, Power Computing, and SuperMac—made for one of the glitziest demos around. But the new BeOS applications—aimed at the “bit-flingers and digital designers of the content the rest of us use,” according to Be Inc. director of marketing Mark Gonzalez—made the biggest splash.

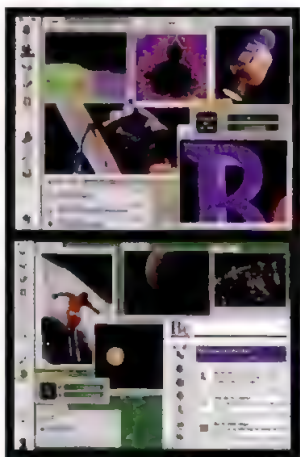
One of the most eye-catching demos showed BeOS running Microsoft Excel and Word concurrently, with the help of emulation software called VirtualMac. Developed by Fredlabs in San

Francisco, VirtualMac allows both BeOS applications and current Macintosh System 7.x applications to be active at the same time, with full data exchange.

BeOS's ability to run existing Mac applications is one of its key advantages over Apple's upcoming operating system, Rhapsody, which will be based on the NeXTStep OS. A follow-up version of Rhapsody, due in 1998, will run existing Mac applications.

Other applications for BeOS include Lorianne Software's Reggae, a frames-based word processor that can reflow text even as you're repositioning an object. Lois, an advanced Web browser from Mipsys, allows automatic indexing, bookmarking, and tab-based viewing of several sites at once.

The BeOS software development kit started shipping just before the holiday season, and the company expects to ship the OS itself by the end of March.



FOR BIT-FLINGERS: Be Inc. hopes its operating system attracts developers and multimedia-hungry users.

A Fistful of Dollars

Revenue from online games is expected to grow to over 11 percent of all online revenue by the end of the decade. Multiplayer games, such as Outlaws, tend to attract loyal customers.



“It is important not to underrate the problem, but it is also important not to overrate it.”

—Apple CEO Gil Amello, paraphrasing Winston Churchill, on Apple's recent lows.

Earn Web Credit Now

Remember green stamps? Collect a bookful by shopping at your local supermarket and you could send away for a free ping-pong table or patio-furniture covers. It didn't take long for Web entrepreneurs to put a cyberspin on that idea.

As a member of FreeRide (www.freeride.com), you can earn points every time you buy such products as Chips Ahoy! cookies, Dove soap, Duracell batteries, Hefty bags, and Wisk detergent at your local store. Earn 1,000 points in a month and you get a free



month of Internet access.

So far, FreeRide is available only to customers of Internet service providers EarthLink and InfiNet, but FreeRide president Jordan Stanley is now signing up other national and local ISPs. “Everyone wants to play,” he says. This spring, Stanley plans to add local products and stores to the roster of national brands. Members earn points by mailing proofs-of-purchase to FreeRide, answering online surveys, subscribing to e-zines, and simply visiting sponsoring Web sites. You'll instantly add ten points to your FreeRide Wallet, for instance, by checking out the Instant FreeRide links that are updated every few days.

Online: Web Beautification

Join us online for a discussion of graphics on the Web to accompany this issue's cover story on personal Web-page editors (“Grand Designs,” page 100). From Web-page design and Web graphics utilities to digital cameras and flatbed scanners, we'll give you up-to-the-minute information. And don't forget to stroll through the gallery displaying the winners of our Personal Web Page Contest. The same *PC Magazine* editors who choose our top 100 Web sites examined hundreds of submissions, and the best of the best are sure to give you great ideas for your own personal Web page. **ALSO ON THE WEB.** Be sure to check in with weekly commentators John C. Dvorak, Michael J. Miller, and Don Willmott for interesting gossip, answers to your questions, and opinions about life on the Internet. Feel free to talk back to them, too. Our discussion forums await your comments.

Pipeline

Free Airwaves

The Federal Communications Commission has raised billions of dollars for the U.S. Treasury through auctions of spectrum licenses for wireless services, but it has also set aside a slice of airwaves for free. The designated spectrum, at the 300-MHz frequency band, will enable schools, libraries, and businesses to link computers, access the Internet, and transmit data, images, and sound at high speed over short distances—wirelessly.

The move opens the door to the development of so-called Unlicensed National Information Infrastructure (U-NII) devices that connect computers, notebooks, and PDAs to each other and to the Web at up to 20



Mbps. School classrooms will be able to connect wirelessly, and you'll be able to check e-mail wirelessly.

In many buildings, says the FCC, a wireless connection will be a cost-effective alternative to pulling wire through walls and ceilings. "While it is too early to know which technologies and devices might succeed in the marketplace," says FCC commissioner Susan Ness, "the potential is created for U.S. leadership in a whole new world of high-tech digital wireless products."

Wired Nation

What does a truly wired nation look like? The best place to get an idea may be Malaysia, where efforts to embrace technology on a sweeping national level are as yet unrivaled by any other part of the world. According to Sun Microsystems' co-founder and chief scientist John Gage, Malaysia—scarcely larger than New Mexico—is the true "model Internet country."

At the heart of Malaysia's transformation from a developing third-world country to a privatized, technology-based economy is Prime Minister Mahathir Mohamad's Vision 2020 strategy. Mohamad has planned a \$20 billion technology park, the Multimedia Super Corridor, for businesses and government to use as a test-bed for new cyberlaws, broad-

casting, entertainment, education, and health care. The Super Corridor will also offer Malaysians virtual boardrooms and live multimedia Internet broadcasting.

Plenty of multinational companies are flocking to Malaysia as a result of the country's welcome tax breaks, recruitment of Malaysian expatriates, and special incentives for companies that attract other companies to the Multimedia Super Corridor.

Japan's Nippon Telegraph and Telephone company is planning to construct a

1 billion yen (\$8.5 million) research and development center there, and Lucent Technologies and Celcom, Malaysia's largest mobile service operator, recently completed a \$48 million deal to upgrade Malaysia's Global System for Mobile Communications (GSM) network.



SKY-HIGH: Malaysia is investing billions in a technology park.

Lite Chips

As network computers (NCs) catch on, Intel is preparing a stripped-down Pentium-class processor for sub-\$1,000 desktop computers. The chips are set to arrive later this year but will probably not show up in systems until 1998.

The chips are targeted at NCs and may show up in Microsoft's NetPCs as well. In the face-off between Microsoft's NetPC

idea and the NC concept from such players as Oracle and Sun Microsystems, Intel's position remains agnostic: It's in partnership with both Microsoft and the NC players, and the new Pentium-class chips are likely to suit designs for NCs as well as NetPCs.

Meanwhile, Cyrix's GX embedded processor, based on a 5x86 core, is targeted at the same class of machines and is scheduled to show up by the second quarter of this year.



What's in a (Domain) Name?

Like toll-free numbers, there just aren't enough Internet domain names to go around. According to InterNIC, the Internet's naming registrar, Internet users have registered nearly a million domain names in the last three and a half years. To meet the soaring

demand, the International Ad Hoc Committee (IAHC), a coalition of organizations from the Internet community charged with solving Internet naming problems, plans to create seven new domains. The new names will be three to five characters long and have a general contextual meaning that will suggest whether a name belongs to an individual, for example, or to a business.

Starting this year, IAHC also plans to increase the number of official domain-name registrars from the 1 that's around today—Herndon, Virginia-based Network Solutions—to an additional 20 and 30 every year. Initially, the IAHC will select applicants from a round-robin lottery to insure that registrars are fairly and equally dispersed around the world.

Name Game	
Domain	Number of registrations
.com	734,674
.edu	3,251
.org	48,117
.net	38,768
.gov	543
Other countries	194
Total	825,547

Source: InterNIC.

Top-Selling Retail CD-ROMs

- 1 **Barbie Fashion Designer** Mattel
- 2 **Microsoft Flight Simulator** Microsoft
- 3 **Command & Conquer Red Alert** Virgin
- 4 **Microsoft Windows 95 Upgrade** Microsoft
- 5 **Myst** Broderbund
- 6 **Toy Story Activity Center** Disney
- 7 **Quicken Deluxe** Intuit
- 8 **Toy Story Animated Storybook** Disney
- 9 **Warcraft II: The Tides of Darkness** Blizzard Entertainment
- 10 **Madden NFL 97** Electronic Arts

Source: PC Data. Data for November 1996.

THIS ISSUE'S CONTRIBUTORS: Angela Hickman, Carol Levin, Sebastian Rupley, and Don Willmott.

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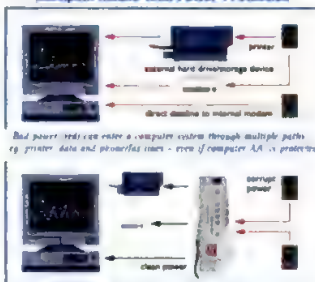
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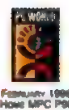
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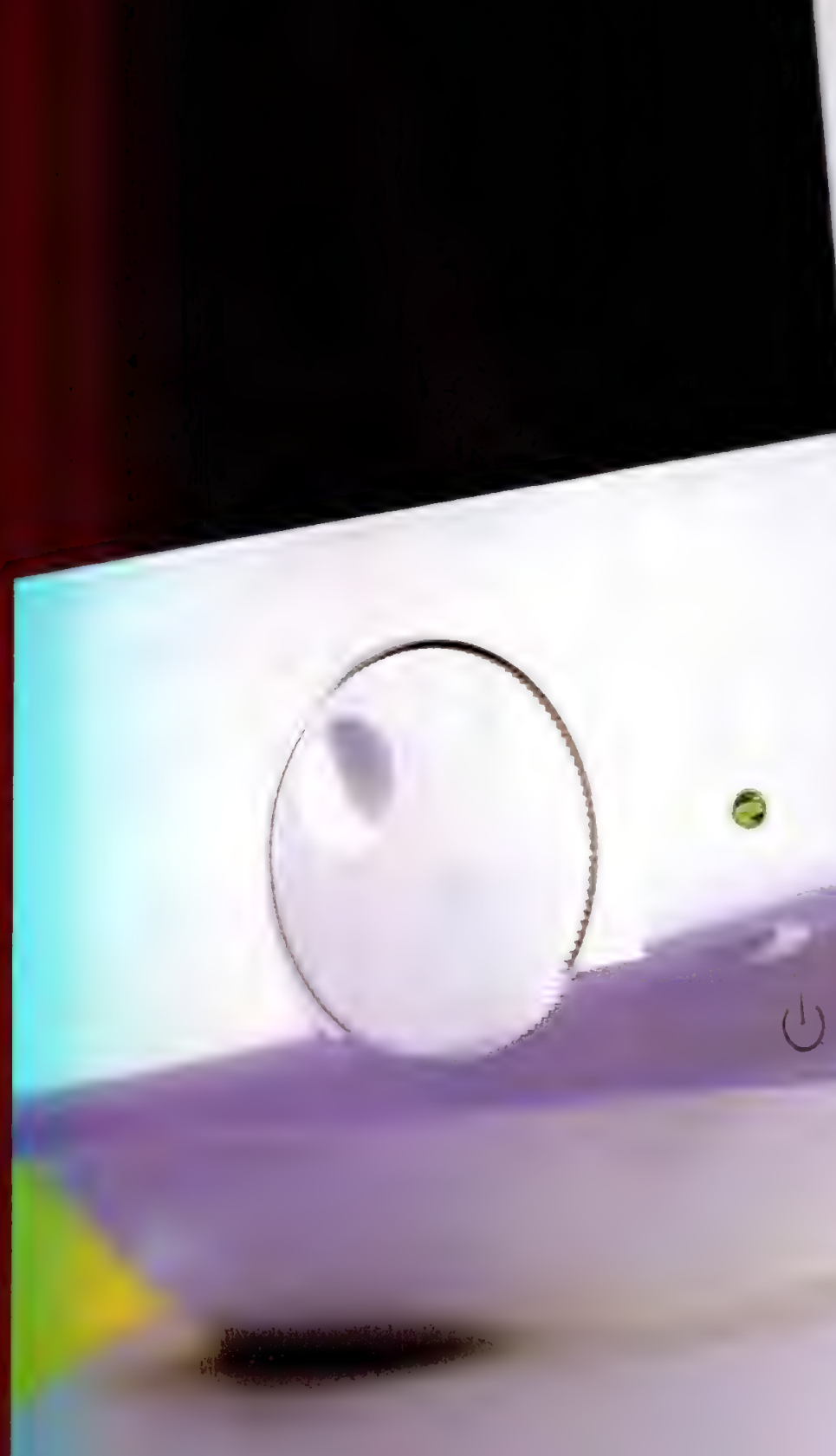


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Letters

YES, IT DOES MATTER

In his column "PCs Are Too Hard to Use, but So What?" (January 7, 1997), Jake Kirchner writes that "personal computers are still too hard to use, but it just doesn't matter." I couldn't disagree more. That personal computers are not user-friendly is a serious problem, which is affecting national productivity and economic competitiveness. Software that is difficult to use is more than annoying: It is indicative of core design flaws in the tools we use to make work more productive, to educate our children, and to foster social evolution.

CHARLES B. KREITZBERG
Princeton Junction, New Jersey

If every computer program worked the way it was designed to, even my four-year-old son could start, play, and exit Disney's *Toy Story* CD-ROM without incident. After upgrading my system, however, an incompatibility problem surfaced between my ATI video card and QuickTime. The video game then started running upside down, leading me to another incompatibility problem with the "visual enhancement" program from Microsoft Plus! for Windows 95. And the drivers for the PCI chip set in my new motherboard proved incompatible with my Toshiba CD-ROM drive. After two reinstalls of Windows 95, three e-mails to ATI, the installation of the new 32-bit version of QuickTime, and the modification of my SYSTEM.INI file, my PC is working again, and my son can finally play his game.

BRAD GOODWIN
via the Internet

THE ROAD TO UTOPIA

Wow! Microsoft wrote a compact OS that runs in just 2MB of RAM (First Looks, "Windows in Your Palm," January 7, 1997). Microsoft Windows CE looks great. I wouldn't even mind seeing it used as a desktop OS, rather than limited to PDAs. Just think of how many schools and nonprofit groups could use hand-me-down 386s to access the Internet with the built-in Internet Explorer. Students could also write papers and do calculations with nonbloated versions of Word and Excel.

DAVID PERCY
via the Internet

HELLO, TOSHIBA? ANYONE HOME?

Based on the rave reviews and Technical Excellence Award given to the Toshiba Infinia



After two reinstalls, three e-mails, and a new 32-bit version, my PC is working again.

figured system sold to me, but largely because of the nonexistent product support.

ARVIND SINHA
via the Internet

Though I agree with most of your comments about the Toshiba Infinia, my experience with the company's support department has been another story entirely. I have been trying for more than three weeks to contact Toshiba by phone, fax-back, e-mail, and BBS and have yet to reach technical support.

FRANK D. MARTY
Minneapolis, Minnesota

WHERE'S THE DUKE?

Your Technical Excellence Awards ("Thirteenth Annual Technical Excellence Awards," December 17, 1996) were chosen wisely except for one: You listed id Software's Quake as the winner in the After Hours category but didn't mention Duke Nukem 3D. Quake has excellent graphics, but Duke Nukem 3D has more features and is very user-friendly. Duke also prevails when it comes to custom maps. Quake maps take up large amounts of space compared with those of Duke, whose CD-ROM even comes with a map builder.

ALEX VALENTINE
Dallas, Pennsylvania

You said that what makes Quake so great is

"kill-everyone-and-their-mother" type of game. It's what you want it to be. The idea behind Quake was to create a canvas for players on which they could put their own ideas. Thanks to the folks at id, there is a wonderful new programming language called Quake C that makes the game very customizable. That, in my opinion, is what makes it such a great game.

JOSH LAYNE
via the Internet

THE DEBATE CONTINUES

Why is it that all of the reviews I read pitting Netscape Navigator against Microsoft Internet Explorer knock Navigator for costing money? How many people actually have to buy Navigator? You can get a free download from the Netscape home page.

RAFAEL PEREZ
via the Internet

Per the user license, Navigator is free only for educational and nonprofit use.—Ed.

HOLY MACRO!

The macros provided in "Tracking Changes to Paragraphs in Word" (Ask Our Advisors, December 17, 1996) were exactly what I needed. I've been pondering this problem for some time now and thank you for your tips.

JEFF A. LINSKOTT
via the Internet

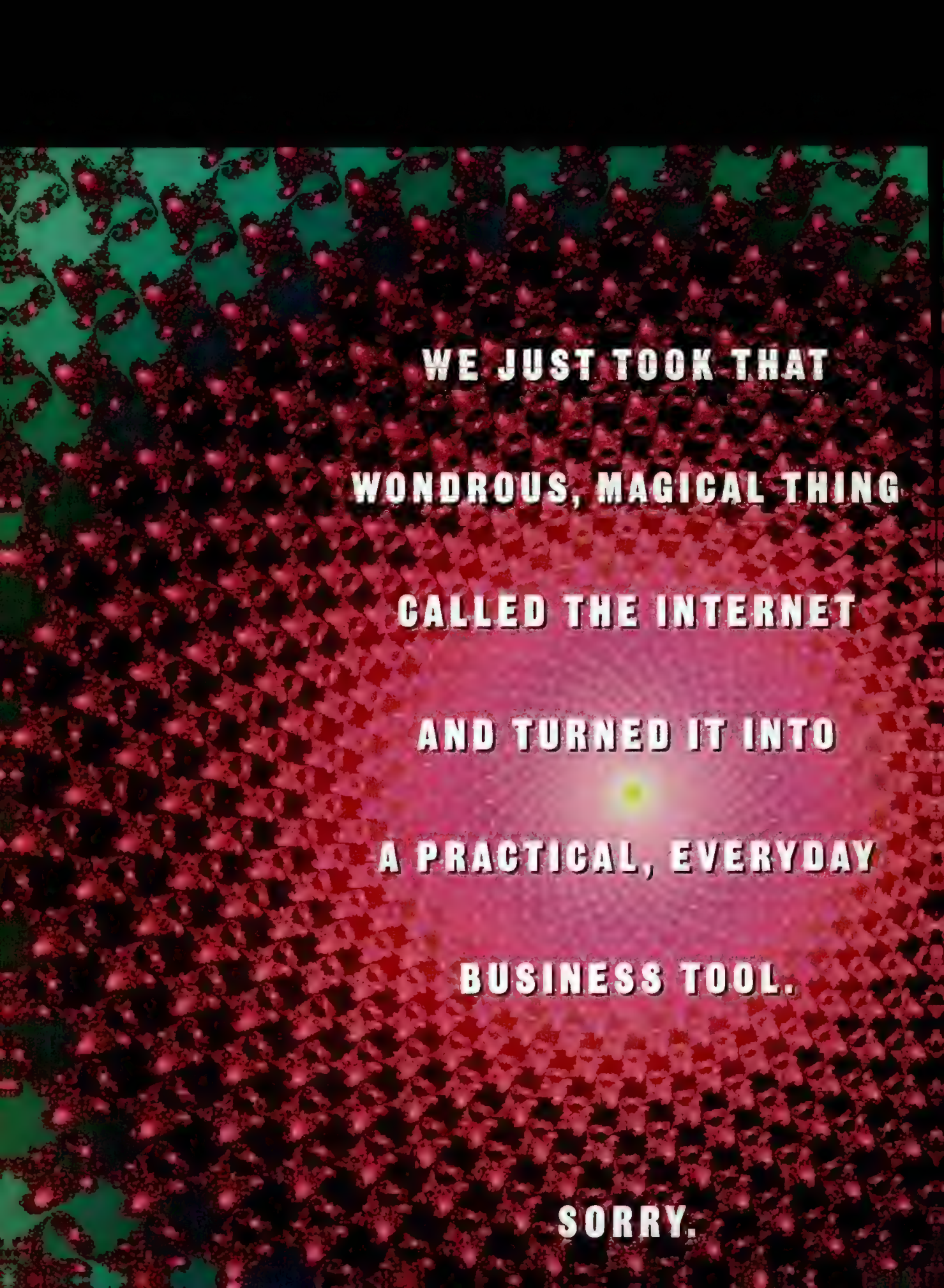
ECO-SURFING

If everybody followed John C. Dvorak's advice to "print, print, print" ("Avoiding Information Overload," December 17, 1996) when doing research on the Web, we'd run out of trees in a week (not to mention ink cartridges). Has he ever heard of saving useful links as HTML files and viewing them later?

GREG JANZEN
via the Internet

MULTIPLE PERSPECTIVES

Thanks for your great issue of December 17, 1996. Jim Seymour's "Destination: Redefinition of the Home PC" sparked my interest. John C. Dvorak's stimulating comments and insights I always enjoy, and his "Avoiding Information Overload" was no exception. And "The Microprocessor at 25"—the two-page article on the evolution of microprocessors—brought back fond memories, including those of my early days using the Atari 400 with the 6502 (sans a real keyboard, hard disk, and floppy disk drive, and



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Letters

UNCOVERING THE LAW

"Navigating the Law" (Trends, December 17, 1996) represented a welcome enlargement of the scope of your software coverage. Law-office PC software is a backwater that has drawn little critical attention—least of all from bar associations. Slow and archaic software abounds and is still licensed at premium prices to consumers with little knowledge, little choice, and little hope that conditions will improve. Greater attention from the mainstream PC community may alert developers to a market ready for better applications.

JEP HILL
via the Internet

A MATTER OF INCHES

During the past four years, I have been unable to find one issue in which you review 15-inch monitors. Most stories have concerned 17-inch monitors, including the one in your issue of October 8, 1996 ("17-Inch Monitors Widen Your Horizons"). But in the same roundup, you include a chart projecting that in 1996, 15-inch units will represent 40 percent of monitor sales, and 17-inch monitors will represent 22 percent. Projected sales for 1997 have 15-inch monitors representing 45 percent of sales and 17-inch units 27 percent.

CHRISTOPHER SCOTT MARCANTEL
via the Internet

REALLY A WHEELIE?

Regarding "Microsoft Does a Wheelie" (First Looks, December 17, 1996): I take exception to the statement, "That seemingly innocuous wheel is in fact the first major innovation in

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CORRECTIONS AND AMPLIFICATIONS

The January 7, 1997, Solutions column contained an error in the figure on page 302. The fifth and sixth lines should have been printed as a single line, as follows:

```
ECHO;; ICHOICE/S/C;%date%; %0>MMDD95$.BAT
```

In our December 3, 1996, Trends item on LCD projectors, the wrong phone number was listed for Lightware, makers of the Viewpoint 100 projector. The correct number is 800-445-9396.

Also in the December 3 issue, pages 298 and 299 should have been reversed.

In "Large, Small, and Colorful" (November 5, 1996, page 73), we incorrectly stated that the resolution of the Canon BJC-620 printer was 720 by 360 dots per inch. The correct resolution is 720 by 720 dpi for all print media.

input devices in years." I have been using MouseSystems' \$50 ProAgio mouse, which has a wheel placed between the primary and secondary buttons. Granted, it doesn't have as clean a design as Microsoft's IntelliMouse. But the IntelliMouse's scrolling feature for now works only with Internet Explorer and Office 97, while the ProAgio's wheel lets you scroll through almost any application that has a scrollbar in Windows 3.x and Windows 95.

BRADLEY D. STOWERS
via the Internet

AUTO TECHNICIANS, GATHER ROUND

As a professional automotive technician for the past 33 years of my life, I was offended by the comment that specifying the right ISDN line installation parameters can be "tougher than keeping a car mechanic from fixing what isn't broken" (Trends, "Way-Fast Phone Lines," January 7, 1997). In all my years as a technician and a business owner, I have found only one "mechanic" who falsely repaired something. You owe our industry an apology.

JERRY PETER KEZHAYA
Plano, Texas

ZOOLOGY 101

The "terribly cute possum" in Mr. Martin's DeskJet is not the "biggest rodent found in a printer" ("The Best of Abort, Retry, Fail?", January 7, 1997). In fact, it isn't even a rodent at all. The opossum is a marsupial, the North American cousin of the kangaroo and duck-billed platypus. Down here in the backwaters of the South, we find the cute little critters everywhere. But in a printer—that's new.

BOB MARSHALL
via the Internet

APPLES AND ORANGES

I was appalled that you compared the speed of four cryptography programs using differing key lengths (First Looks, "Psst! Keep a Secret?", December 17, 1996). Of course the programs with the shortest key lengths will go faster than the ones with the longest.

PATRICK A. COLVIN
Jamul, California

The cryptography article was first-rate, but the product comparisons were a bit skewed. The test chart shows an interesting relationship (PGP for Windows outperformed SecretAgent using twice the key length), but a second comparison is desirable so that you compare products with identical key sizes.

MONTY LEIBRANT
via the Internet

I found the review of cryptography programs incomplete and misleading. The speed chart is comparing apples and oranges.

RANDALL T. WILLIAMS
via the Internet

Since there was no key length common to all four programs, we tested them out of the box, as the consumer would receive them.—Ed.

SYSTEM INTEGRATION

It was interesting to read about installing multiple OSs (Operating Systems, "All on One Computer," December 17, 1996). I have been running my home PC with a dual OS since my boss convinced me that Windows 95 was the only real way to connect to the Internet.

ANDREA MONTGOMERY
via the Internet

I enjoyed the article on OSs. I've been running DOS, Windows NT 3.1 and 3.51, and OS/2 2, 2.11, and Warp under IBM's boot manager for some time.

DON SHELDON
Atlanta, Georgia

AN HONEST PERSPECTIVE

I was pleased to see Michael J. Miller's critical summary of the state of personal computing ("Unfinished Business," January 7, 1997). To frame a best-of-year issue with even such careful and judicious remarks is courageous. As Miller is certainly aware, when he touches on the poor state of systems and network integration, he is acknowledging a key issue as well as hitting a raw nerve for many.

JOHN DALY
via the Internet

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emissions. This reaffirms Nokia's leadership in the science it pioneered.

The media-ready series does more than extend Nokia's most award-winning model (7 industry "Bests" so far). It literally shouts innovation. Dual powered stereo speakers in front combine with a subwoofer in the swivel/tilt base to shape audio at the intimate volumes most suitable for working close to a monitor.



447Xavc—Adds to X series features with built-in color video camera

This gives you the kind of audio system that multimedia and communications applications require, without a nest of wires and speakers fighting for the precious real estate around your computer.

The audio capabilities of the media-ready series extend to the built-in microphone set in the top of the bezel (at ideal voice height). This feature completes the requisites for computer telephony. The 447Xavc model even houses the world's first inboard color video camera for video-capture and conferencing. Truly, the media-ready series enables the complete convergence of computing and communications.

Of course, each of these systems comes with full digital controls and on-screen menu-driven adjustments (which Nokia also pioneered). Yet their pricing is remarkably competitive. All of which makes the new 447X series a necessity for anyone making full use of their computer. After all, the best way to meet the standards is to work with the people who set them.

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Waiting for 2000

Is millennial madness inevitable?



At the turn of the millennium, mainframe computers around the world will enter the twentieth century. That's because software designed to represent the year using two-digit date fields instead of four-digit date fields will assume that 00 means 1900 rather than 2000. The miscalculation is expected to wreak havoc on financial, scheduling, insurance, and bookkeeping applications on a grand scale.

The ease with which PC owners can resolve the so-called Year 2000 problem is in marked contrast to the difficulty mainframe users are having. The current versions of many off-the-shelf software packages for PCs already handle the date change, but mainframe software is often customized to meet the needs of individual companies, making the year 2000 a potential nightmare.

PC applications that can't handle the date change properly can be converted and distributed fairly easily, says Nicole Vanderbilt, an analyst with market research firm Jupiter Communications. "From the PC consumer's perspective, this is not a big issue," she says, since developers can fix the problem and release a new software version in one fell swoop.

Microsoft, for example, recently released an updated version of Microsoft Access that correctly interprets "00" to "29" as shortcuts for the years 2000 to 2029. The previous version, Microsoft Access 95, didn't handle the conversion properly. Access users will have to buy the new version of the program if they want it to work in the year 2000.

The projected financial impact of the Year 2000 glitch is alarming. Market research firm Gartner Group estimates that the total cost of correcting the digital snafu will be between \$300 billion and \$600 billion. And the Information Technology Association of America projects that companies will have to spend \$1 to convert every line of affected software code.

—Angela Hickman



Testing Scanners with a Clean Slate

WE DIDN'T WEAR AIRTIGHT BIOSUITS OR surgical masks for this issue's color flatbed-scanner roundup ("Capture the Color," page 163), but our team's technical analyst, Denis Tom, and support technicians Mark Valentine, Glenn Menin, and Dave Strauss went through several containers of condensed air, antistatic cloth, and photographic-glass cleaning solution during two weeks of testing. Most high-quality scanners can pick up even a tiny speck of dirt on the scanner's platen or on the original image, which in turn can distort scanned images. Since our Labs and editorial staff had to choose which devices produced the best images, keeping the scanners clean was a top priority.

To our surprise, several units came out of the box with dust and dirt already under the glass platen. In some cases, removing the glass from sealed units to clean them can void the warranty, so be sure to ask to open the box and examine the scanner before you buy.

We also reinforced our knowledge that scanners, being optical devices, are rather delicate. Before you can set one up, for example, you must first carefully unlock its scanning arm—located under the glass bed—from the position in which it was set at the factory. Any jarring or jerky movements during unpacking or installation can damage the arm, affecting its ability to scan.

HELPFUL HINTS

Our Labs team conducted a battery of tests, most of which consisted of scanning specialized targets and reflective and transparent art. We came up with a few pointers along the way that may help you if you're in the market for a scanner.

Each scanner we reviewed is a SCSI device, so we used either the SCSI adapter

card that shipped with the scanner or one that was already installed. If you've installed a good SCSI card in your system, such as a PCI-based SCSI II card, you'll want to stick with that one in favor of giving up an IRQ and memory-address space for a second SCSI card.

You might find, however, that the scanner doesn't come with the proper cable.

The Adaptec 2940-U card we used requires a high-density SCSI II connector cable that doesn't come with any of the scanners we tested. Try to obtain cable information before you buy your scanner. The cable should be no longer than 6 feet; any more could

introduce "noise" into the scanned image. Noise is caused by signal attenuation, which often yields unwanted pixels.

Thicker, more expensive cables not exceeding 3 feet in length are best.

When scanning, you'll want to be aware of the scanner's highest optical resolution, since choosing the wrong resolution can produce less-than-optimal results. Scanners allow you to set the scan resolution for the intended output (referred to as PPI or DPI or even the target printer's LPI, depending on the product) without regard for true optical resolution—the amount of information per inch a scanner can actually read. A resolution setting above the maximum optical resolution will result in interpolation, a situation in which nonexistent pixels are rendered to give you the resolution you requested. Those pixels are derived from those that were scanned using mathematical algorithms in the scanner's firmware or Twain driver. Interpolation can be a good thing if you have to scale up a small image or text for optical character recognition, but it's unnecessary for most work.—Jeff Mace



Klamath Cometh

Intel preps 233-MHz chip-on-a-cartridge.

The Intel Klamath processor, a rethinking of the Pentium Pro, will arrive sometime next quarter on a metal- and plastic-encased card known as an SEC (single-edge-contact) cartridge, a strategy that could lengthen the life of motherboards and allow for smooth upgrades. Although Intel is not publicly discussing Klamath, industry newsletter *Micro-processor Report* has published details of the chip's design.

Unlike previous Intel processors, the Pentium Pro couples the CPU and secondary-cache chips on a single piece of hardware. This increases the efficiency of calls between the two chips, but it also increases Intel's production costs. Klamath is a scaled-down version of the Pentium Pro that adds MMX technology (a set of 57 new multimedia instructions) but forgoes an on-board secondary cache. Klamath will likely debut at 233 MHz before midyear, then grad-

uate to 266 MHz soon after.

The secondary cache in an existing Pentium Pro runs at the same speed as the CPU, but Klamath's L2 cache will probably run at half the speed of the CPU. This results in a slight performance loss, but Klamath's L2 cache will still operate faster than that of a Pentium.

Processor Game Plan		
Intel processor	Expected debut	Expected features
Klamath	Mid-1997	233 to 266 MHz; MMX; larger L1 cache; 0.35µ CMOS process; larger than 196 square mm
Deschutes	End of 1997	300 to 333 MHz; 0.25µ CMOS process; 120 square mm; low-voltage design for notebooks
Katmai	Mid-1998	MMX2, which may support 3-D geometry and dual floating-point operations
Willamette	End of 1998	100-MHz bus; larger die size than Klamath and Deschutes use but greater performance

To offset this change, Intel will probably increase Klamath's L1 cache from 16K to 64K. In addition, the SEC cartridge that carries the chip will likely hold the secondary cache and will connect to a motherboard via an edge connector. The SEC cartridge allows Intel to optimize the interaction of the CPU

and the L2 cache while reducing the electrical emissions that could hamper performance.

Though current Pentium Pro motherboards cannot accept the new cartridges, vendors can easily equip the motherboards with a connector that will. Processor upgrades will then become simple: As vendors change processors and L2 cache sizes, they can simply add in new cards without changing the motherboard design.

Reportedly, Intel has designed Klamath to match the performance of the Pentium Pro under 32-bit code and to improve performance under 16-bit code. Klamath will also run at higher clock speeds and cost quite a bit more than the Pentium Pro. Six months after Klamath's debut, Intel plans to introduce Deschutes—a low-voltage version of Klamath that will probably run at 300 to 333 MHz and allow for the first Pentium Pro notebooks. In 1998, Intel expects to ship Katmai, which will offer new MMX instructions and perhaps support for 3-D geometry, and then Willamette, which may use a 100-MHz bus.—Cade Metz

JAKE KIRCHNER

Talking Trash, Spending Cash

When I first heard rumors that Apple planned to "bring back Steve Jobs" by acquiring NeXT Software, my first thought was neither "What a break for Apple" nor "What a wicked recovery for Jobs." No, my immediate thought was, "Thank goodness; now we'll have someone new giving the keynote address at Comdex!"

It's not that I'm just getting bored with Bill Gates, Andy Grove, and Jim Barksdale—that tired troika of showstoppers who seem to be the ordained headliners of every conference, show, seminar, and garden party this industry spawns. I'm *way* past bored seeing these guys pop up every month to give the same speeches with the same themes and the same visuals. And Scott McNealy and Larry Ellison, the occasional stand-ins, don't offer much relief.

Any way you look at it, the speakers list has gotten pretty stale, particularly as the Internet vapor has overcome the market. The half-baked browsers, dueling Java implementations, and warring thin-client promises have produced an almost overwhelming fuzzification of the market. The more nebulous the product introductions have become, the more strident the keynote speeches by the companies' chief pitchmen have been.

Their oratorical approach, evidently, is that if you have nothing new or concrete to say, say it more loudly and more forcefully. And by all means, be sure you make a personal attack on your competitor's chief executive, and remember that sarcasm is the primary tool of effective public speaking.



At a conference in November, Sun Microsystems CEO McNealy showed a video in which a Gates impersonator exhorted the audience to "write me a check." McNealy, who earlier in the year likened PCs to "the common cold," urged his audience to cease all investment in desktop computers. At the same November show, Oracle CEO Ellison said his company would throw out all its PCs if doing so wouldn't overflow the company's dumpsters.

Gates travels from venue to venue deriding McNealy's comedic talents and tweaking Ellison for past

failed investments. Netscape president Barksdale, whose company has yet to meet an industry standard it can't improve on, accuses every competitor of selling proprietary products. Intel's Grove, with a dismissive wave of his hand, makes it clear he believes all his competitors and their customers are idiots.

These are the captains of the fastest-growing industry in the world? These are grown men? If they can't bring themselves to have pity on those of us who have to sit through these presentations every month or so, you'd think they'd at least have the sense to stop insulting their target customers.

Well, I've had it with that approach. I'm ready for a fresher take on the industry. For that reason, I'm really looking forward to hearing more of what Jobs has to say after ten years of self-imposed relative obscurity. I just hope that, unlike his appearance at the MacWorld Expo, we don't always have to sit through 2 hours of Gil Amelio first.

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DESKTOP PCS

Return of the Monoputer

Fed up with all those hulking beige boxes that house your desktop's CPU and monitor? Three new all-in-one desktop systems boast small footprints, sleek designs, and the convenience of a flat-screen LCD display.



ALL IN ONE:
Systems from (clockwise from left) ACT, Monorail and Compaq.

play; the tradeoff is in power and components.

First out the door last fall with such a configuration was Compaq Computer Corp. (800-345-1518, www.compaq.com). The \$3,000 **Compaq Presario 3060**, with an integrated, double-bright 12.1-inch active-TFT display,

is powered by a 200-MHz Pentium MMX processor with 24MB of EDO RAM. It comes standard with a 3.8GB hard disk, integrated sound and graphics, 2MB of graphics memory, a 33.6-Kbps DSVD modem, a cordless Logitech mouse, and a 4-disk autoload 8X CD-ROM changer. Two JBL Pro speakers are embedded in the case, just behind the swivel-mounted screen. The system offers ample room for expansion, including two ISA slots, two PCI slots, one combination ISA/PCI slot, two 5.25-inch expansion bays, and two USB ports.

As with the rest of the Compaq Presario home line, the 3060's case features Easy Access Buttons, which allow quick access to the CD-ROM drive, telephony functions, system sleep mode, and



on-screen help messages.

All Computer Technology (800-775-1953, www.allcomp.com/acw) is offering the \$3,300 **Brillianta LD 5000 LCD-PC**. The unit's design is similar to the Compaq's, but the rounded speakers jut out from the sides of the case; internally, things are much the same. Component manufacturers vary, presumably to keep the cost of the system down. ACT's Brillianta comes standard with 32MB of RAM, a 2.5GB hard disk, a 33.6-Kbps modem, a 12X CD-ROM drive, and a 12.1-inch TFT screen.

The least expensive flat-screen unit comes from Monorail (888-880-7245, www.monorail.com). Specifically designed to appeal to non-techies and first-time computer buyers, the system has a more radical, notebooklike case design than the Compaq and the ACT.

The \$999 **Monorail Model 7245** and the \$1,299 **Monorail Model 133** each come with a 10.4-inch dual-scan LCD panel, 16MB of fast-page-mode



RAM, a 4X CD-ROM drive, a 33.6-Kbps V.42 modem, and integrated speakers. The Model 7245 comes with a 75-MHz AMD K5 processor, a 1GB hard disk, and only 512K of VRAM (an upgrade to 1MB costs \$49.99). The Model 133 has a 133-MHz Pentium CPU from Intel, a 2.1GB hard disk, and 1MB of video RAM.

One caveat: The Monorails are sold as consumer electronics devices, so the warranty is voided if you open the case. But upgrades should be hassle-free, thanks to the company's door-to-door agreement with Federal Express.—*Josh Levy*

RECAP A First Looks review of the Compaq Presario 3020 appeared in our issue of December 3, 1996.

UPGRADES

Jogging Your Memory

Does your PC or notebook seem a bit sluggish? If so, it may be time to upgrade system memory. Here's a selection of options that are optimized and approved for use with specific systems.

Kingston Technology (714-435-2600, www.kingston.com) has a wide variety of after-market memory modules. The latest releases are available for everything from servers to notebooks.

Add power to IBM's PC Server 325 with the \$425 32MB module; at the high end is the \$3,000 128MB module. Jazz up Compaq's Professional Workstation

5000 with upgrades from 16MB to 128MB (prices range from \$225 to \$3,045).

New offerings for portables include memory modules for Toshiba's Tecra 500CDT/CS and 510CDS/CDT. Prices start at \$130 for an 8MB module, with a 16MB module costing \$240 and a 128MB module costing \$2,710. Two modules are available for the Texas Instruments Extensa 900 series; the 8MB module starts at \$125, while the 32MB module is \$610. Upgrade options for the NEC Versa 2400 series are also simple: There are two choices, an \$85 8MB module and a \$160 16MB module.

If you're in the market for memory that's not specific or optimized for a particular system, Simple Technology (714-476-1180, www.simpletech.com) offers memory upgrades from 4MB to 128MB and beyond. For

a desktop PC, an 8MB upgrade costs \$60, 16MB cost \$120, and 32MB cost \$235.

Simple Technology also features a full offering of memory upgrades keyed to specific systems. For those looking to get even better performance out of their Gateway 2000 Destination series PCs, there are 8MB, 16MB,

and 32MB SDRAM customized modules available; prices range from \$115 to \$345.

On the portables side, Simple Technology has new modules available for the Compaq Presario 160/160ES/170/180 series of notebooks, and the Toshiba Tecra 740 CDT and 730 XCDT. The Compaq memory starts at just \$100 for 8MB of EDO

RAM (\$160 for 16MB and \$290 for 32MB). The Toshiba memory is available in 8MB, 16MB, 32MB, and 64MB modules, with prices ranging from \$115 to \$695. Simple Technology has also released new memory capacities for the Toshiba Tecra 500CDT/CS and 510CDS/CDT, and for the Texas Instruments Extensa 900 series.

Similar configurations that seem to change daily are available from TechWorks (888-484-5464, www.techworks.com), which touts its customer support, and Viking Components (714-643-7255, www.vikingmem.com), which has announced a number of special upgrade options for Compaq machines.—*Josh Levy and Melissa Perenson*



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Best in the World?



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Xircom sets the pace in the industry with leading-edge mobile communications products. The CreditCard Ethernet+Modem 33.6,



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In an industry where speed is everything, the Xircom CreditCard Ethernet+Modem 33.6 gives you the fastest Ethernet LAN and modem performance in one convenient card.



Xircom CEM 336 - 10BT USR Courier V.34
Everything PC Card. Source: Janner for. 1st
Throughput measured in Kbps.



Xircom CEM 336 - 10BT 3Com EtherLink III-3C589
Source: Net Bench 4.01. Throughput measured in
Mbps. Block size: 1024 bytes.

HINT Rave Reviews

The CreditCard Ethernet+Modem 33.6 captured the coveted *Computer Reseller News* Test Center Recommended award at Comdex/Fall '96.

"Installing the Ethernet+Modem 33.6 was a joy...total install time, including breaking the shrink-wrap, was less than five minutes."

- Henry Liem, *CRN* Reviews Editor



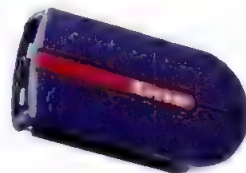
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HINT Best Support

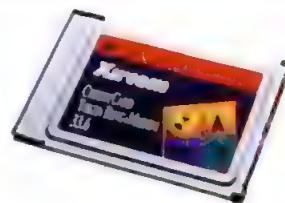
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SCANNERS

Interact with Your Scanner

As evidenced by this issue's scanner roundup ("Capture the Color"), there's no dearth of ways to digitize your documents. But how do you organize the resulting hodgepodge of files?

From Xerox Desktop Document Systems (888-997-2447, www.pagis.com) comes the \$169 **Pagis Pro 97**. Offering full support for scanning and managing color documents, the Twain-compliant software lets you scan, copy, fax, and print your scanned documents with ease. Pagis Pro's seamless integration with Microsoft Windows 95 and Windows NT Explorer makes it simple to move and manage scanned documents, and you can view convenient thumbnail images at the same time, without using a proprietary virtual-file-cabinet system.

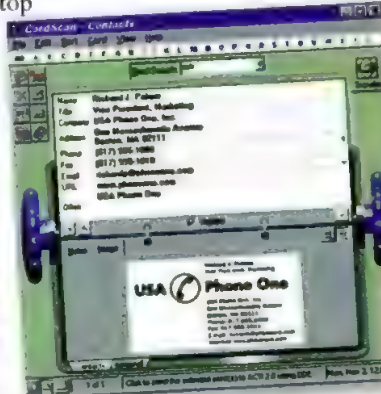
Thanks to the package's integration of Verity's Topic search engine, you can conduct full-text search and retrieval operations. Also integrated into Pagis Pro is Xerox's optical character recognition (OCR) software, TextBridge Pro. Pagis Pro's PerfectScan feature allows you to capture and enhance documents; a one-touch scan feature automates the process.

Also introducing a 32-bit product is Visioneer (800-787-7007, www.visioneer.com). The \$100 Twain-compliant **PaperPort Deluxe** is an enhanced version of the PaperPort that's bundled with Visioneer's and Hewlett-Packard's sheet-fed page scanners and Compaq's and Visioneer's scanner keyboards.

By automatically performing OCR on every scanned document, the SimpleSearch feature provides full-text searching of the contents of your documents. Matches and near-matches to your search query are made using a fuzzy-logic ranking system.

Another addition is the archive-

and-backup-to-removable-media feature, which lets you move and store documents with ease. The filing system has been improved to support nested folders, up to five levels deep. In addition to



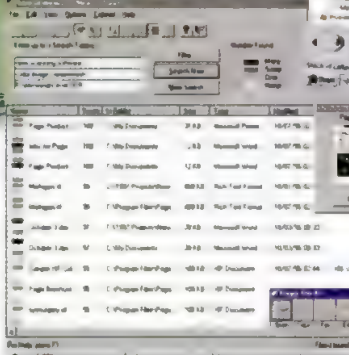
drag-and-drop links to over 150 applications, PaperPort Deluxe integrates light versions of Xerox's TextBridge SE and Quicken Expensable SE, and Visioneer's FormType 1.1.

The ScanDirect feature lets you scan documents directly into the desired application. A Netscape Navigator and e-mail plug-in facilitate Internet communications.

Are you overwhelmed by the number of business cards you've amassed? Then the \$99 **CardScan 3.0**, from Corex Technologies Corp. (617-492-4200, www.cardscan.com), may solve your problem. The Twain-compliant software is also available in a \$299 bundle, **CardScan Plus 300**, that includes both software and a business-card scanner.

CardScan scans and performs OCR on your business cards, automatically classifying such card infor-

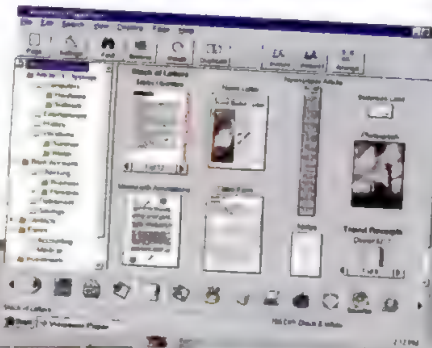
FILE MANAGEMENT: (from left to right) Corex's CardScan Plus 300, Xerox's Pagis Pro 97, and Visioneer's PaperPort Deluxe.



mation as name, title, company name, address, telephone and fax numbers, and e-mail and URL addresses. The information is

placed in the appropriate database fields of the included CardScan Plus software, and bitmaps of card images are retained for future reference.

A PIM in the most fundamental sense, CardScan Plus lets you dial your phone, compose letters, send faxes, and address e-mail from within the program. If you're already committed to a PIM, CardScan can transfer data via



dynamic data exchange (DDE) into such popular contact managers as Act!, ECCO, Lotus Organizer, Maximizer, and Now Contact.

A boon for offices, this version of CardScan lets you share card file databases across a network and open multiple databases as well.—Melissa J. Perenson

MANAGEMENT PROGRAMS

HR Department

Do you need a way to manage your employees? Three packages help you with three different sides of human resources management.

Analyze the skills of your employees with PRI Associates' **TapDance** and various testing modules (919-493-7534, www.priassoc.com). TapDance is a skills-testing package that lets you assess a user's proficiency with various software packages. The latest modules offer tests for Corel WordPerfect 7, Corel Quattro Pro 7, Lotus WordPro 3.1, Microsoft Word 7, and Microsoft Excel 7; each test module

costs \$199 and includes a copy of TapDance. The software lets you administer a series of up to ten tests at one sitting, test groups, customize testing, and do comparative testing.

Jam.Logic Designs' \$499 **HR Task Counselor Version 2.5** provides an effective employee management and compliance tool for small and midsize businesses (800-750-8113, www.milehigh.net/jam/). The network-ready package organizes key human resources data, and it provides for an employee handbook, internal job postings, and a legal reference li-

brary to assist you with government regulations.

If you need a program specifically for creating an employee handbook, there's KnowledgePoint's **\$129 Policies Now! 5.0** (800-727-1133, www.knowledgepoint.com). Targeted at both small and large businesses, the package uses an interview process, coupled with the expertise of human resources and federal labor law experts, to help you write customized employee policies. There are over 80 policy topics in all and hundreds of links to related Internet sites. Completed handbooks can be published to HTML for use on an intranet or to paper using the integrated handbook designer and built-in word processor.—MJP

Trends Peripherals



Putting On a Good Show

The portable-LCD-projector market continues to change the way corporate salespeople and marketers strut their stuff. Lighter, brighter, cheaper models are providing an attractive option for mobile presenters, whose hosts traditionally either provided 21-inch monitors or suffered the consequences of viewing PowerPoint presentations from cramped notebook screens.

Epson (800-463-7766, www.epson.com) has rolled out two projectors. On the VGA front is the compact, 15-pound **ELP-3500**. The \$7,999 unit is unmatched in its class, lighting up the screen with 650 ANSI lumens. Epson's SVGA offering is the \$9,999 **PowerLite 5000**, which weighs 14

pounds and projects 450 ANSI lumens. Each unit includes an infrared remote control that allows you to control the presentation



from anywhere in the room.

InFocus Systems' (800-294-6400, www.infocus.com) SVGA contender is the \$9,499 **LitePro**

720. Rated at 450 ANSI lumens,

this unit weighs in at a mere 12 pounds, making it one of the most portable models around. The LitePro includes an infrared remote control and features CableWizard, which lets a user easily connect audio, mouse, and monitor loop-through to the

projector. The LitePro has a one-year warranty.

Sharp's latest offering is the \$7,995 SVGA **NoteVision**. (800-

RECAP We reviewed five portable LCD projectors in our August 1996 issue. An Editors' Choice was awarded to the Viewpoint 100 from Lightware.

237-4277, www.sharp-usa.com/products/pro). Shaped like a pack of ledger pads, this 15-pound model is rated at 400 ANSI lumens and has a built-in carrying handle.

An altogether different approach to projector design comes from Sarif's debut model, the **Shuttle LT800** (888-937-2743, www.sarif.com). This \$7,195 SVGA projector weighs less than 14 pounds and projects at 330 ANSI lumens. Unlike comparable models, the Shuttle sits upright, so it stands tall and requires minimal desktop space; the footprint is 6.5 inches by 9 inches, and the unit is 13.5 inches high. Its lens is set near the top to project from the highest position possible.—Toni Kistner

VIDEO EDITING

I'm Ready for My Close-Up

Want to elicit a quick excuse and a sudden exit? Just ask someone to sit through your home movies. No matter how enthralling you find that 20-minute clip of your toddler splashing in the pool, for the sake of your audience consider one of two new video-editing solutions aimed squarely at the camcorder contingent.

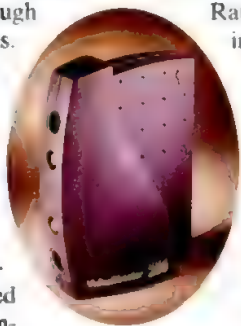
Lowering the barrier to this activity is Pinnacle Systems' (415-526-1600, www.pinnaclesys.com) \$295 **VideoDirector Studio 200**. VideoDirector opens up video editing to everyone by letting you use your existing camcorder, VCR, and computer (provided it is a 386 or later and has 8MB of RAM and 5MB of hard disk space).

edit videotapes and add such effects as wipes and dissolves.

Rather than store video images on your computer's hard disk for editing, you store the unedited tape in the camcorder, then pass it through the Pinnacle's mixer—an external device that's slightly smaller than a bookshelf stereo speaker. The actual editing is accomplished using the included VideoDirector Suite 3.0 software. You can then copy the edited tape from the mixer

onto a fresh videotape.

The software locates the beginning of each scene on the camcorder tapes and lets you drag and drop scenes in any order. Or you can add titles and transitions as well as sound ef-



MIX AND MATCH: Pinnacle Systems' VideoDirector Studio 200 makes it easy to edit video tapes and add special effects.

You can even combine scenes from different tapes.

Owners of Mystique, the 2-D/3-D graphics accelerator from Matrox Graphics (800-361-1408, www.matrox.com/mga), have another option. The \$279 **Rainbow Runner Studio** is a companion card for video editing with high-resolution Motion JPEG (MJPEG) compression at an affordable price.

The card snaps easily onto the Mystique board to let you capture video from a VCR, camera, or laser disk. Editing is done using a customized version of Ulead Systems' MediaStudio 3.0. Although you need plenty of hard disk space, Matrox has developed a method for playing the compiled video back directly from the cut list, saving up to 50 percent of the hard disk space normally required for playback. Final video can be saved to hard disk, CD-R, or VCR tape, either in MJPEG format or converted to MPEG or .AVI format. The card also supports video-conferencing, frame grabbing, output to TV, and hardware

STORAGE

Eagle's Nest

Can't decide whether a tape drive, Zip drive, Jaz drive, or removable hard disk is right for your data-storage and data-sharing needs? Then why not get them all? The Eagle Division of Exabyte Corp. (888-637-8488, www.exabyte.com) has built the Eagle Nest to accommodate all four of those options and several more. Simply install the \$99 chassis in a 5.25-inch drive bay, connect it to your IDE controller and the Nest is ready to accept any of the company's swap-in/



swap-out drive modules. The first modules to take flight are an 8GB Travan tape drive (\$419), an Iomega

Zip 100 (\$199), a 120MB super-floppy disk LS-120 drive (\$250), and a 1.44GB hard disk (\$450). Other nest-ready modules will follow.—TK

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VRML BROWSERS

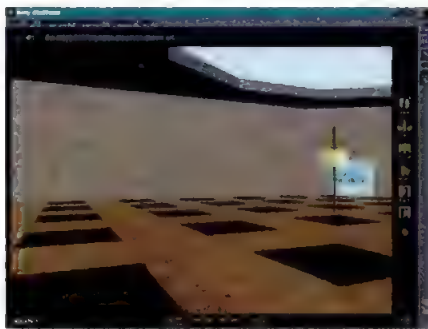
Moving Worlds on the Web

When the VRML 2.0 specification was ratified, it promised to transform Internet 3-D from a novelty into a useful and powerful media format with provisions for audio, animation, and multiuser worlds. That promise is about to be fulfilled with the first wave of VRML 2.0 browsers; all these browsers are available for free download.

Cosmo Player, from the VRML pioneers at Silicon Graphics (800-800-7441, [vrml.sgi.com](http://www.vrml.sgi.com)), employs an intuitive interface for moving through and inspecting 3-D worlds. This Netscape Navigator plug-in utilizes Intel's Realistic Sound Experience (RSX) for 3-D specialized audio. If

you're looking for a place to give Cosmo Player—or any other VRML 2.0 browser—a try, stop by Silicon Graphics' Web site and watch the twice-weekly installments of "Flook," the company's new 3-D cartoon series.

Intervista Software's **World-View 2.0** is a Netscape Navigator plug-in that lets you move through VRML 2.0 worlds from within your browser window (415-434-8765, www.intervista.com). Like Cosmo Player, World-View uses RSX for audio support. The interface offers such conveniences as the ability to adjust the speed of movement manually, reset to a straightened or default position with a single



VIRTUAL TOWN HALL: *Community Place 2.0 integrates chat functionality directly into the VRML browser.*

even allows you to send voice messages to other users in a virtual chat room. You can choose an avatar for these multiuser rooms and modify the way your voice sounds when heard by others. Community Place audio uses Microsoft DirectX for audio support.

For help locating VRML 2.0 worlds, you can consult the Weblynx Ultimate Virtual-

click, and zoom in on any object in a world with the Go To button.

Taking a different approach is Sony Corp.'s **Community Place 2.0** (vs.sony.co.jp). This VRML 2.0 browser is available as either a helper application or a Netscape plug-in. The standalone version has built-in chat functions and

Library (weblynx.com.au/virtual.htm) or any of the sites listed above.—Andrew Boscardin

RECAP PC Magazine reviewed 11 VRML 1.0 browsers in the issue of November 5, 1996; Vream's WIRL received an Editors' Choice award.

INTERNET SEARCH ENGINE

Can't Find It? Draw a Map

Ever feel as if you need a map to make your way through the results generated by a search engine? Then Semio Corp.'s SemioMap may be the search tool for you (415-802-2940, www.semio.com). Instead of providing copious pages



of URLs, this new search site literally draws you a map of returned hits using a Java application, displaying clusters of related terms to help narrow your search.

The Semio search engine groups results based on determined relationships between the terms and pages it finds and indexes. For example, a search for "web browser" yields clusters of terms, including "online services" and "product reviews" as well as links to such related phrases as "world wide" and "web server."

When you click on a cluster, SemioMap either draws you a new map with more clusters or displays a list of URLs.

Semio is planning to release two commercial versions of the search engine—SemioMap Workgroup Search and SemioMap Global Search—for deployment over corporate intranets.

RECAP

PC Magazine reviewed ten search engine sites in the issue of December 3, 1996; Excite, HotBot, and Yahoo! won our Editors' Choice awards.

As an innovative alternative to text-based search sites, SemioMap should be a natural on the graphics-oriented Web.—AB

WEB DEVELOPMENT TOOLS

Making HDML Work

Web developers have been asking for software products that make the latest crop of hand-held devices compatible with Hand-held Device Markup Language (HDML) browsers. Two packages not only convert existing HTML pages into HDML but provide flexible ways to build Web pages.

Allaire Corp.'s \$495 **Cold Fusion Professional 2.0** (888-939-2545, www.coldfusion.com) uses its own server-side code called CFML (Cold Fusion Markup Language) as an alternative to ordinary HTML. CFML builds interactivity into your pages by embedding direct links to databases and other content sources. Unlike HTML, which tells your browser directly what to display, CFML uses template pages to instruct the server on how to construct HTML or HDML pages, which are returned to the browser. CFML then tells the browser how to draw the page.

To make your Cold Fusion site accessible from a hand-held device, you need to compose an alternative template in HDML. When the server detects a hand-

held device, it reroutes the user from the HTML page to the HDML version.

While Cold Fusion lets you build Web sites using an environment familiar to HTML programmers, the Sapphire Group's **PageBlazer 2.0** (703-736-8090, www.pageblazer.com) uses PageBasic, its own scripting language, whose syntax is similar to Visual Basic's. PageBasic attaches to the Web server via Netscape's and Microsoft's APIs (developers' version, \$795; single-server license, \$1,795) and uses the same source code for HTML and HDML pages.

PageBlazer works by making a physical separation on the server between the code that draws the actual pages and the code that directs users through the site. This distinction makes it easier to reuse images and sequences, as well as to route users through the site and detect errors. The Page Layout Framework lets you render proprietary content and layout in any markup language, including HDML, by running a special code-optimization routine.—Josh Levy



The Biggest News in Notebooks is Available Today

13.3" DISPLAY

TRAVEL PRO 2010CX

The World's Most Advanced Portable Computer

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1000CX	Pentium 66	16MB	2.1GB	1000CX	Pentium 66	16MB	2.1GB
1000CS	Pentium 66	16MB	2.1GB	1000CS	Pentium 66	16MB	2.1GB
1000C	Pentium 66	16MB	2.1GB	1000C	Pentium 66	16MB	2.1GB
1000CS*	Pentium 100	16MB	2.1GB	1000CS*	Pentium 100	16MB	2.1GB

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THREE
YEAR
WARRANTY
3

CD-ROM CHANGERS

A Speedy CD-ROM Library

Networked CD-ROM server towers and jukeboxes reflect the extreme ends of the networked CD-ROM family. Towers represent speed, with one reader for every disk; jukeboxes represent archiving capacity, with one reader for every 20 or 30 CDs. A new crop of CD-ROM mini-changers that feature one reader for every four disks offers a scalable solution that fills in the gap between towers and jukeboxes.

The **Netserve/CD 800-mini32** and **Maxtet/CD 800-mini32** are CD-ROM servers from Optical Access International (617-937-3910, www.oai.com). Each is a desktop tower with eight Nakamichi 4-disk CD-ROM drives, for a total capacity of 32 disks. Larger versions are available in tower or rack-mount systems and can hold up to 256 disks. The \$7,395 Maxtet/CD connects to your LAN via the SCSI port on your file server; while the \$8,395 Netserve/CD tower connects directly to your network via a 10Base-T Ethernet connection. The towers feature locking doors, cooling fans and filters, and a digital display that helps you monitor each drive.

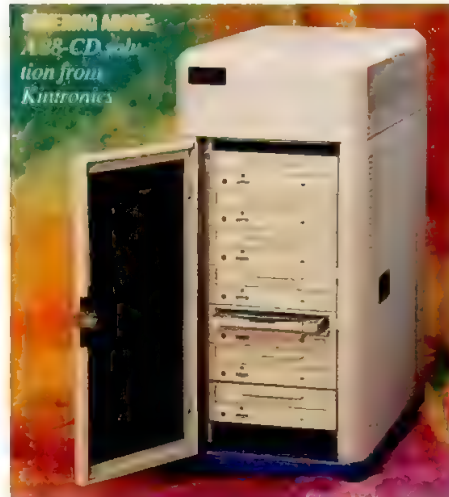
The 8X Nakamichi CD-ROM drives don't have caddies or trays; each disk simply slides into place and stays there. The hot-swappable drives have a claimed transfer time of 1.2 MBps and a seek time of 150 ms. The readers switch from one CD-ROM to another in just 3 to 4 seconds, compared with the 12 or more seconds required by a conventional jukebox.

With a claimed rate of 100,000 hours between failures, it's no wonder Kintronics (800-431-1658, www.kintronics.com) also uses the Nakamichi four disk changer in its CD-ROM server solutions. The \$3,300 **CDRJ7288x-Netserv** includes a tower of seven drives and an Axis 32-bit RISC

CD-ROM server that attaches to an Ethernet network. The server lets you set up your CD-ROM library on IBM, x Novell, Unix, and Windows networks, and it supports a range of protocols, including FTP, HTTP, IP, IPX, NetBIOS, SNMP, and TCP.

The tower of CD-ROM drives attaches to the server via the SCSI port. Versions with 14, 21, and 28 drives are also available, allowing you to house and manage up to 112 CD-ROMs. The tower itself features a locking door along with ventilators and filters to keep out dust.

For a little more flexibility, Kintronics also offers the \$3,700 **CDRJ7288x-Soft**, which includes a tower of seven CD-ROM changers and Smart Storage Software's



management package, SmartCD. This software version runs on Novell and Windows NT networks, and it includes the same management and security features as the CDRJ7288x-Netserv, but it doesn't limit you to a 10Base-T connection. You can install

SmartCD and run it on whatever server you like at whatever connection speed you choose.

Like Kintronics, Micro Design International (800-228-0891, www.mdi.com) ships the Nakamichi drives in units of seven. MDI's \$895 **SCSI Express Mini-changer 4CD8X** comes in tower, rack, and Compaq rack configurations.

MDI also offers **CD-Express Connect**, a standalone CD-ROM tower that requires no other servers. The \$4,395 tower connects seven single-CD drives directly to the LAN and is managed through MDI's Express Admin software.—David R. Lambert

REMOTE-CONTROL SOFTWARE

Remote Connections

Need to connect to your PC from a remote system? Making the transition to a native 32-bit application is **Carbon Copy 32**, from Microcom (800-822-8224, www.microcom



MIRROR IMAGE: Carbon Copy 32, from Microcom.

.com). This \$149 package lets you connect two Windows 95 or Windows NT PCs via a modem, LAN, or Internet connection. With Microcom's new Multiwait feature, you can dial into the host's modem even if other users are connected to the host via the LAN or the Internet. And Carbon Copy 32 fea-

tures voice support in ASVD and DSVD modems. By using a combination plug-in and ActiveX controller called Carbon Copy/Net, you can use Carbon Copy with Netscape Navigator and Microsoft Internet Explorer.

Carbon Copy 32 gains speed by ignoring the Windows opening splash screen and saving bandwidth for more useful data; when you make changes to a document remotely, Carbon Copy 32 transmits only the changes not the entire document.

Funk Software's **Proxy Remote Control 2.0**, which starts at \$195, is another upgraded 32-bit remote-control package for Windows 95 (800-828-4146, www.funk.com). A version for Windows NT is in beta and should be available soon. The current version runs not only in Windows 95 but in Windows 3.x, DOS, and NetWare file servers as well. As with Carbon Copy 32, you get two licenses, one for the host

and one for the client or master.

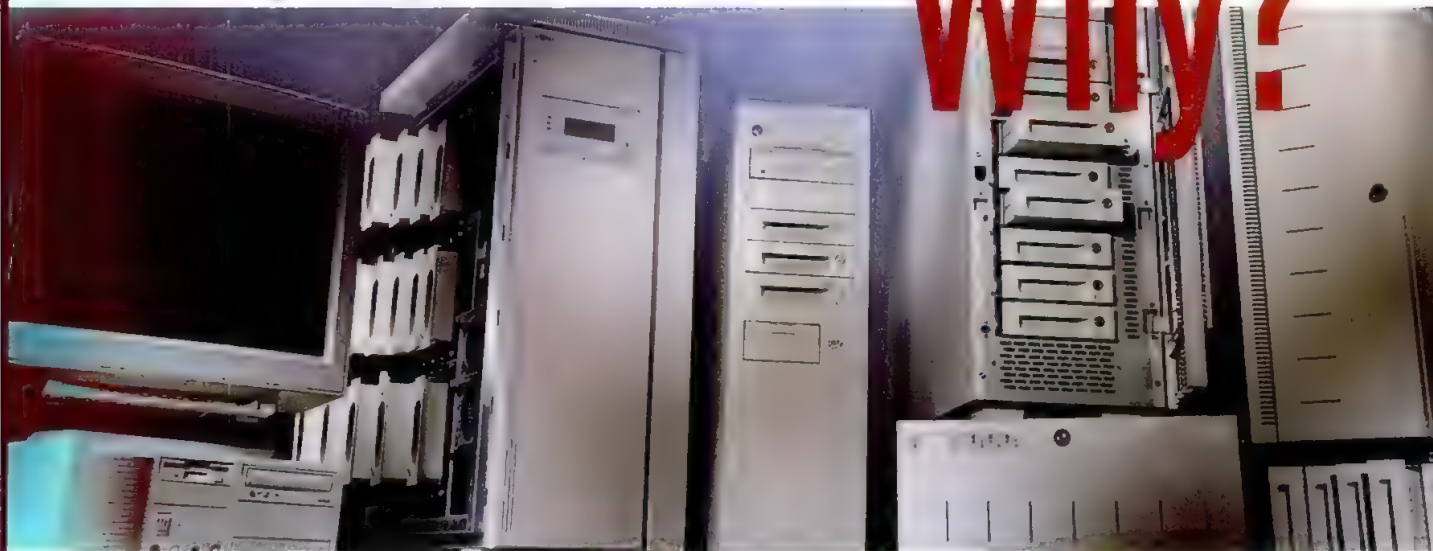
With Proxy, you can connect to your host PC over a LAN, an IP dial-up network, or the Internet. But unlike Carbon Copy 32, Proxy provides only a one-way connection; to reverse the connection you must disconnect, then reconnect.

Proxy offers several security features, from simple host screen-blanking, which prevents spying, to an automatic reboot of the host PC if the connection is lost. And the user of the host PC has to give explicit permission before a remote user can take it over.

In **ReachOut 7**, Stac (800-279-7822, www.stac.com) provides a host of security features and 32-bit remote access for Windows NT. ReachOut 7 (\$139 street) provides three levels of user rights and integrates with the Windows NT User Manager, providing a single user name and password list.

Like Carbon Copy 32, ReachOut 7, with its included ReachOut Passport client software, can work with both Microsoft Internet Explorer and Netscape Navigator. ReachOut 7 is backward-compatible with previous versions, and it supports DOS, Windows 3.x, and Windows 95 as well.—DRL

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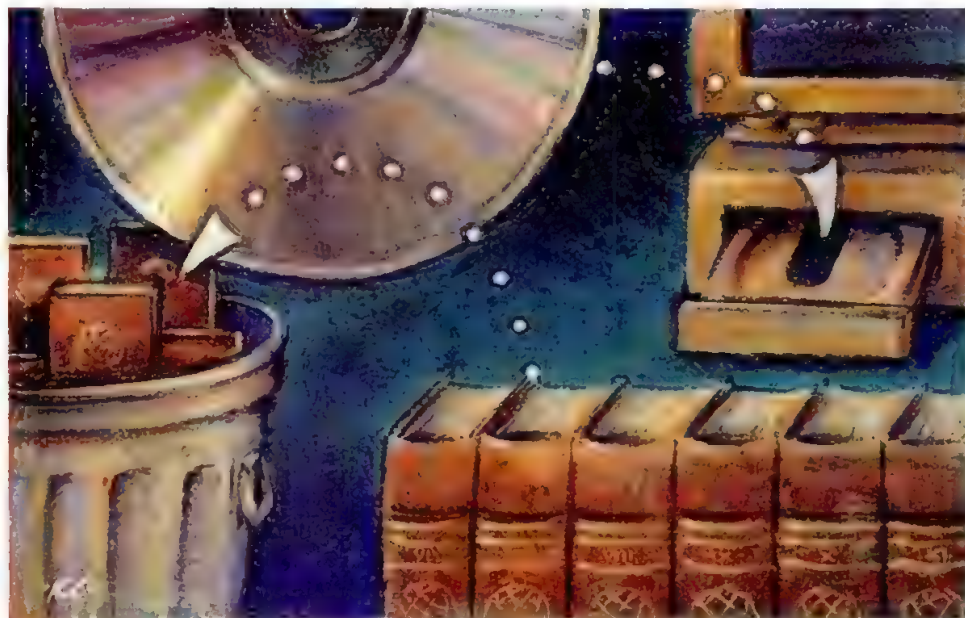
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First Looks



Information, Please

It's time to throw away those printed encyclopedias that are hogging bookshelf space.—By Craig Stinson

Unlike the paperless office—which turned out to be a fantasy—the paperless encyclopedia is a reality as solid as the 30-volume Britannica set at your local public library. Burgeoning sales of CD-ROM drives and rising numbers of multimedia-capable PCs point to an irreversible trend: The encyclopedia action is no longer at the printing press but on the CD.

The five CD products reviewed here—Encyclopaedia Britannica's \$300 Britannica CD 97, Compton's Home Library's \$45 Compton's Interactive Encyclopedia 1997 Edition, Grolier Interactive's \$50 1997 Grolier Multimedia Encyclopedia, Microsoft Corp.'s \$80 Microsoft Encarta 97, Deluxe Edition, and IBM Corp.'s \$60 World Book 1997 Multimedia Encyclopedia, Deluxe Edition—all offer huge advantages over their printed

counterparts. As compensation for the inability to flip through pages and admire the typography, the electronic products are compact and vibrant, and many update themselves automatically via the Internet.

DATA SQUEEZE PLAY

Because the information in these encyclopedias is stored as digital bits on an optical surface, these products include immense amounts of information—including sound and video clips—on one or two CDs.

These CD-ROM encyclopedias let you search for articles electronically using Boolean operators and proximity qualifiers. They also provide automatic cross-referencing hyperlinks, and forward and back arrows make it easy to walk a trail of see-also references without having to haul heavy volumes back and forth

between bookcase and easy chair. And all of them provide some form of bookmarking capability, so you can flag items that are important to you.

Perhaps the biggest attraction of the electronic encyclopedia is its ability to deliver the goods in several formats. On CD, the encyclopedia is no longer limited to static text, tables, pictures, and maps. The information can jump off the screen and into your child's imagination, because the CDs present videos, animation sequences, sound, and even occasional virtual-reality tours.

An animation sequence can explain not only how a process, such as mitosis, occurs, it can demonstrate it. Videos provide a you-are-there experience of important historical events. And sounds bring distant cultures to life in a way that words alone cannot match.

The combination of hyperlinking and media is so compelling, in fact, that many of these electronic encyclopedias can function as much as entertainment programs as reference tools. Hopping from

INSIDE

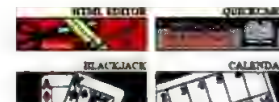
SIGHTINGS:

Bigfoot for Life provides you with an e-mail address that follows you around. See page 76.



MULTIMEDIA ACCELERATION:

STB's Velocity 3D, in combination with TV PCI, delivers graphics and data in a whole new way. For details, see page 73.



BRAVE NEW WORLD:

Domino 4.5 meshes Lotus Notes with the Internet. See page 64 for the review.

More Products Reviewed...

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First Looks Online

From February 17 to 21, go Online to discuss this story.
www.pcmag.com/discuss.htm



First Looks

text to image to sound clip to video to map can be every bit as absorbing as surfing the Internet. And it's quicker, because all the data is local.

BRAIN DRAIN

Both Encarta and Compton's include games to test what you've learned, making them valuable interactive teaching tools. If you don't know what you're looking for, Britannica, Encarta, and World Book can also browse articles at random. In Encarta and World Book you can limit the random picker to particular topic categories or media types. Compton's has an option to start up with several informational tidbits of the day plus a challenging question that is linked to the article where the question is answered.

If amusement is a subtle draw for these volumes, homework support is an explicit selling point. Compton's, Grolier, Encarta, and World Book are all clearly designed to assist with preparing school reports. Compton's and Encarta even generate the appropriate footnote automatically when you transfer text to a word processor document.

There's a sharp distinction among these five programs when it comes to overall content. Britannica overwhelms the competition in terms of depth—the subject of mathematical analysis gets more than 80,000 words—but it is limited to text and static pictures. Encarta sets the standard for presenting a multitude of facts, thoughts, and ideas in a profusion of sights, sounds, and video. Grolier and World Book have the best maps. Compton's, on the other hand, has considerably less sound and video and seems suited more for the elementary-school crowd than high-school students.

When it comes to usability, Encarta gets top marks. But if you

intend to do a lot of casual browsing, the double-CD Deluxe Edition may force you to buy a CD-ROM disk changer. (For more information, see "CD-ROM Jukeboxes," January 7, 1997.) The obvious long-term answer is DVD, which can hold several times the data of a CD-ROM.

In the meantime, any one of this year's crop will provide your children—and you, once they've gone to bed—with a nearly inexhaustible supply of intellectual stimulation.

Encyclopaedia Britannica Inc.

Britannica CD 97

It's nothing special to look at, and it doesn't do multimedia, but the 67,000 articles and 44 million words contained on its single disk make the \$300 Britannica CD 97, from Encyclopaedia Britannica, the richest store of knowledge that you can plug into your CD-ROM drive.

Britannica's CD contains the full text of the \$995 printed encyclopedia, along with an electronic copy of Merriam-Webster's Collegiate Dictionary, Tenth Edition. Unfortunately, the computer screen is less than ideal for reading lengthy articles, and Britannica does little to help you print them.

Britannica articles are coded in HTML, and for viewing it supplies Netscape Navigator 2.0, which is installed for you auto-

matically if you don't already have a copy on your PC. Not surprisingly, getting around Britannica is like working the Web: Colored hyperlinks take you to see-

of each hit.

New in this edition is the ability to use plain-English queries. We typed, "Who was the first woman in the Senate?" After a quick search, Britannica returned as first choice an article on Hattie Ophelia Caraway (the first woman elected to the Senate), with other pieces on Rebecca Ann Felton (the first woman seated in the Senate) and Sandra Day O'Connor (the first female Supreme Court justice).

A companion product, Britannica Online, provides for two major omissions in Britannica CD 97: updates and links to related Internet sites. The online service costs \$50 per year—\$150 if you don't own the CD—and includes access to the full text of the CD in addition to the updates and Internet links.

If you have a gigantic appetite for information, a copy of Britannica CD 97 makes a great addition to your software library.

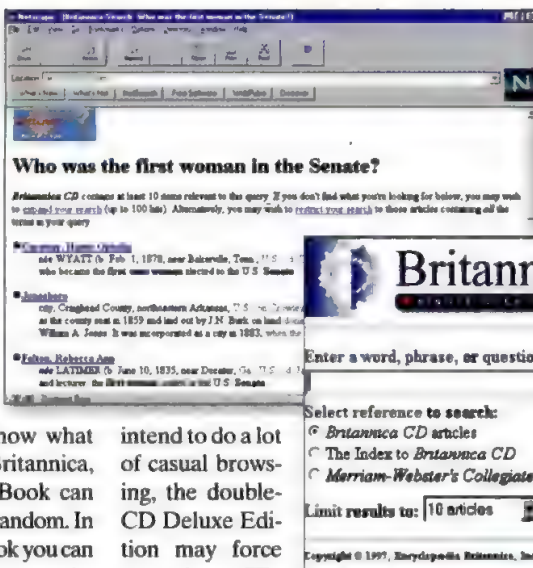
Compton's Home Library

Compton's Interactive Encyclopedia

The abilities of the \$45 Compton's Interactive Encyclopedia 1997 Edition, from Compton's Home Library, belie its inexpensive price. And its offerings in astronomy are unique.

When you start up the program, an option offers to present information about events and birthdays that occurred on that particular date in history. Then a second start-up screen offers a challenging question, with a link to the article where the answer can be found. A third screen offers hints and tips about using the encyclopedia.

A Recent Events command on the main menu displays a narrated slide show of important 1995 events. A Picture Tour command offers additional—though silent—slide shows on such common topics as Fine Arts and Communications, as well as on more mysterious subjects—Goose Bumps and



also references, forward and back buttons let you move ahead and retrace your steps, and the familiar Bookmarks menu lets you flag items of interest.

On CD, Britannica breaks its articles into page-size chunks. A Contents button displays an outline of the current article, and each outline entry is linked to its associated piece of text. References to related articles appear as in-text links, and additional Index buttons—sprinkled liberally through the text—take you to items of potential interest in the encyclopedia's index.

Being able to formulate highly focused electronic searches is particularly valuable for ferreting out minutiae from Britannica's voluminous articles. The Search facility ranks hits according to their probable value, limits hits to ten by default, and displays the first paragraph

Editors' Choice

• Microsoft Encarta 97, Deluxe Edition



When it comes to CD-ROM Encyclopedias, there's an embarrassment of riches. We award an Editors' Choice to Microsoft Encarta 1997, Deluxe Edition

for its innovative use of multimedia, which is the closest thing on the PC to educational television.

With its balanced content and clean, attractive design, Microsoft Encarta 97 sets the standard of excellence in this year's field of multimedia encyclopedias. Its lengthy animations, historical videos, and wide-ranging sound clips appeal to the eyes and ears as well as the mind. The program's transparent,

usable Pinpointer and its new collages ensure that Encarta will be used as a tool for browsing and discovery, as well as for traditional looking up.

Users who want more detailed textual content than a multimedia encyclopedia can provide should turn to Britannica CD 97. Britannica provides textbook-length arti-

cles on major topics, a search engine that accepts natural-language as well as Boolean formulations, and a fully complete set of cross-references and index entries. It won't dazzle you with its multimedia content (because it has none), and it won't give you free monthly updates (you have to pay an extra \$50 and use the program's online companion product).

IBM's electronic rendition of the popular World Book encyclopedia is a strong new contender among this year's crop. Its maps are more informative than Encarta's, and the questions appended to its longer articles make it especially suitable for school libraries and classrooms.



Bright Ideas, for example. Users can watch the slide show, read the captions, and look for items of interest. A menu choice summons the article that corresponds to the slide.

The Planetarium command—which is unlike anything in the other encyclopedias—lets users explore the heavens. This feature, which only works in Microsoft Windows 95, shows the current astronomical highlights at the user's location. A click on a constellation brings up an article about it; a click on any other object gets you that object's ascension, declination, and visual magnitude. In case those terms aren't familiar to you, the program offers a dictionary and a thesaurus, and it has a liberal dose of glossary pop-up boxes.

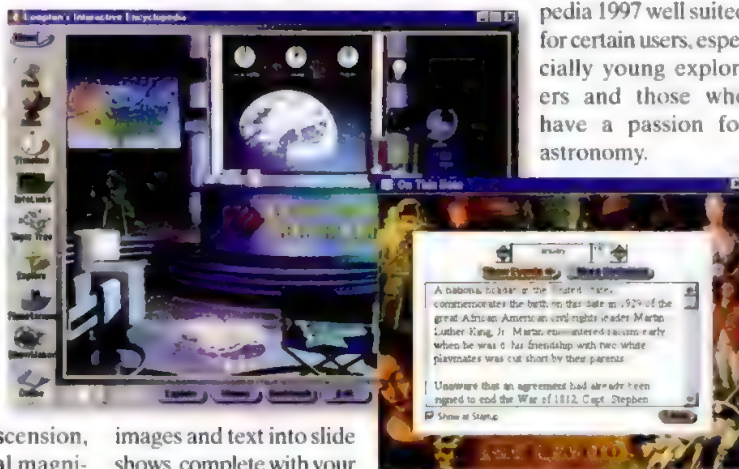
For the younger set, there's an Explore command that takes you to your choice of six Environments: Compton's Newsroom, Compton's Skyship, Grandma's Attic, Kaleidescape, Madcap Music, and Wild and

Free. In these graphical surroundings, you can click on various objects and be transported to related articles.

A ShowMaker command—also without counterpart in the competition—lets you assemble

an outline of the entire knowledge base to get to an area of interest. The search facilities include all the expected Boolean and proximity operators.

Its unusual features set makes Compton's Interactive Encyclopedia 1997 well suited for certain users, especially young explorers and those who have a passion for astronomy.



images and text into slide shows, complete with your own voice-overs.

Compton's maps are not as informative as those in some other products. They have no hyperlinks, for example, and they show only the most rudimentary political landmarks. But you can zoom in on any point on earth.

In the encyclopedia, you can browse and search by media type or time line. Or you can use

Grolier Interactive Inc.

1997 Grolier Multimedia Encyclopedia

Behind a no-frills user interface and an irritatingly inadequate help system, the \$50 1997 Grolier Multimedia Encyclopedia, from Grolier Interactive, presents an appealing array of articles, maps, videos, and animation sequences. At times, though, the content seems a bit skimpy.

The program's maps are especially plentiful and useful. Equipped with hyperlinks to related text, they do a good job of covering historical and political topics. For instance, using separate maps and accompanying articles, we looked at the status of Asia at several different points in time—from 750 AD to 1945.

Grolier also offers a dozen animation sequences that outline such important events in U.S. history as the Revolutionary and Civil wars, and the American role in World War I and World War II. There are also a handful of clips covering broader historical movements—The Machine Age, for example—and several interesting historical videos.

On the sound front, Grolier



First Looks

is less satisfying. Birds and beasts are well represented (although less so than in Encarta and World Book). There are historical gems, such as a recording of William Jennings Bryan making his famous Cross of Gold speech, but many of the musical clips are formulated in expressionless MIDI format. The program's non-MIDI examples fail to credit their human sources, and several clips are marred by awkward cuts and splices.

Grolier lacks both the random-browse capability of Britannica, Encarta, and World Book, and the games that enliven Compton's and Encarta. But it has time line browsing, and Boolean and proximity search operators.

Grolier's guided tours let you stroll through some of the CD's larger topics. Our favorites were quick studies of the American novel, American women, and the world of insects. But Grolier is filled with annoying inconsistencies: the common-loon article, for example, appear in the guided tour of Music, in Sound and Science, between cello and contralto.

Grolier offers two forms of on-



1997 Grolier Multimedia Encyclopedia
Street price: \$50
Requires: 8MB RAM, 10MB hard disk space, Microsoft Windows 3.1 or Windows 95
Grolier Interactive Inc., Danbury, CT
800-787-3000
www.grolier.com
Circle 416 on reader service card

line outreach: CompuServe forums and Web sites. Unlike other programs, though, it forces you to connect to the Internet before showing you what Web sites are available for a particular topic.

Grolier's text-transfer capability is limited. You can save an article as a plain-text file, or you can press Ctrl-A to select the whole document and move it to your word processor via the

Clipboard. The problem—which happens in other CD-ROM encyclopedias as well—is that paragraph indentations and font information get lost in the process.

On balance, Grolier's incisive maps and animations offset its poor text handling, odd organization, and awkward online augmentation.

Microsoft Corp. **Microsoft Encarta 97 Encyclopedia**

Microsoft Encarta 97, from Microsoft Corp., is a CD encyclopedia for all seasons: It is just as appropriate for a child's school report as it is for adults in search of an important fact or an educational video.

Available in standard and deluxe editions, Encarta offers 31,000 articles; the \$80 Deluxe version includes 153 videos and animations, while the \$55 standard edition has 100. More important, the Deluxe edition comes with 18 monthly updates, delivered via the Internet. You can spend \$19.95 a year to get the update package separately for the standard edition, but you might as well spring for the extra \$25 and get the Deluxe package in the first place.

Like World Book, Encarta Deluxe comes on two disks, and the program's browser can drive you bananas with its disk-swapping demands. Encarta is a bit less maddening than World Book on this score, because it duplicates much of disk one's text on disk two. New in this year's Encarta are nearly three dozen 360-degree panoramic views, but you need Windows 95 or Windows NT to take advantage of this exciting visual effect. The views afford a virtual-reality experience of important architectural sites and metropolitan areas.

Encarta also introduces 20 collages—attractively produced assemblages of sound, images, and text—that invite users to explore sets of related topics. You can browse through such topics as After Communism, Communications Technology, and Mythology and Folklore among others.

Encarta's 85 animation sequences are outstanding. The military history items are particularly worthwhile, covering major battles—not just American conflicts but such globally important events as the Battle of Hastings and the Battle of Waterloo.

Other animation sequences explore scientific concepts: the general theory of relativity, biological processes, such as mitosis, meiosis, and fertilization, and the workings of commonplace mechanical devices. The program's videos include

SUMMARY OF FEATURES

CD-ROM Encyclopedias: Side by Side

	Britannica CD 97	Compton's Interactive Encyclopedia 1997 Edition	1997 Grolier Multimedia Encyclopedia	Microsoft Encarta 1997, Deluxe Edition	World Book 1997 Multimedia Encyclopedia, Deluxe Edition
■ YES ■ NO					
Products listed in review order					
Street price	\$300	\$45	\$50	\$80	\$60
CDs	1	1	1	2	2
Articles	67,000	37,000	35,000	31,000	17,500
Sound clips	None	601	594	2,300	361
Videos and animations	None	100	76	153	145
Online links/Free updates	None/None	AOL/Monthly	CompuServe, Internet/Monthly	Internet/Monthly	Internet/Intermittently
Bookmarks/Annotations	■ ■	■ ■	■ ■	■ ■	■ ■
Dictionary/Thesaurus	■ ■	■ ■	■ ■	■ ■	■ ■
Link to word processor	■	■	■	■	■



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PC World Reliability & Service Survey—PC World, December 1996





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June 25, 1996
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June 25, 1996
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May 16, 1995
Home MPC P90



1994 and 1995



January 1996
Millennia P133



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- 2.5GB EIDE hard drive
- 12X EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit 3D Waveable stereo sound card
- Advent® AV270 2x25 watt stereo speakers
- 33.6 fax/modem, speakerphone, voice mail
- Microsoft Phone telephony software
- Internet ready: SPRINGNET Internet trial membership, Microsoft Internet Explorer 3.0
- America Online and CompuServe trial memberships
- PCI 64-bit 3D video, MPEG, 2MB EDO RAM
- 17" Micron 17FGx, 28dp (15.8" display)
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 and MS Plus! CD
- Microsoft Works 4.0 CD
- Quicken Financial Pak: Quicken Deluxe 6.0, Quicken Financial Planner, Quicken Parents' Guide to Money, Quicken Family Lawyer and free TurboTax 1996 coupon
- Family Pak: ABC by Dr. Seuss, Thinkin' Things Collection 1, Earthworm Jim and Mechwarrior 2
- Microsoft Home Pak: Publisher Deluxe, Encarta Encyclopedia, Monster Truck Madness and CD sampler

✓ 5-year/3-year Micron Power warranty

\$2,699

With Intel 164MHz Pentium processor ... subtract \$100



VETIX LXI

The Custom Server Solution

deal for business owners and users, custom tailor a Micron Vetix LXI server to fit your company and its growing needs.

▶ **GET INVESTMENT PROTECTION** with a reliable server solution that's designed to grow with your company and adapt to the needs of your changing network.

▶ **INCREASE INVESTMENT SECURITY** with a server that's backed by an industry-leading warranty. With every system we offer direct 24-hour telephone support and three network operating system incident resolutions. A variety of on-site service options are also available from industry-leading service provider Digital Equipment Corporation, including system setup and four-hour response support.

STANDARD FEATURES

- Dual Pentium Pro ZIF sockets
- 256KB integrated L2 cache
- Memory upgradable to 1GB with 8 DIMM slots
- 8 expansion slots: 5 PCI, 2 ISA, 1 shared ISA/PCI
- Integrated Adaptec PCI Ultra/Wide SCSI-3 controller
- 12X SCSI-2 CD-ROM drive • 3.5" floppy drive
- Integrated SVGA Graphics
- Integrated Intel EtherExpress™ Pro 100 controller
- 9 drive bays: 6 internal 3.5", 3 external 5.25"
- 15" Micron 15FGx, 28dp (13.7" display)
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows NT Server 4.0 (10-user license)
- ✓ 5-year/3-year Micron Power™ warranty
- 1-year next-business-day, on-site service*
- Dedicated server technical support 7x24
- NOS Support (3 incident resolutions, 1-year 7x24)

VETIX™ LXI

Intel 200MHz Pentium™ Pro processor

- 32MB ECC EDO RAM
- 2GB Ultra SCSI hard drive

\$4,999

Bus. lease \$170/mo.

- 64MB ECC EDO RAM
- 4GB Ultra SCSI hard drive

\$5,499

Bus. lease \$173/mo.

VETIX™ 2LXI

Dual Intel 200MHz Pentium Pro processors

- 128MB ECC EDO RAM
- Dual 2GB Ultra SCSI hard drives (4GB total)

\$6,899

Bus. lease \$217/mo.

- 256MB ECC EDO RAM
- Dual 4GB Ultra SCSI hard drives (8GB total)

\$8,599

Bus. lease \$270/mo.

*On-site service for the Vetix LXI server is provided by Digital Equipment Corporation and is optional.

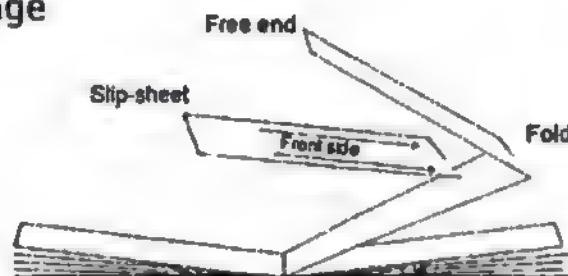


MICRON ELECTRONICS, INC.

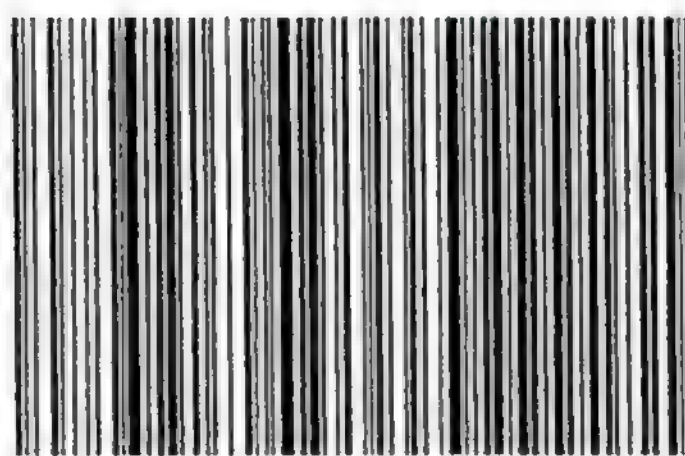
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www.mei.micron.com

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Foldout slip-sheet



Inverted Foldout slip-sheet

Folded edge of the page

1. Open the foldout page

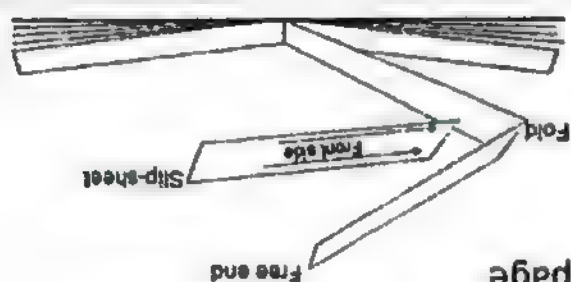
2. Insert this sheet with

1. Front side touching the free page

2. Arrow pointing to the fold

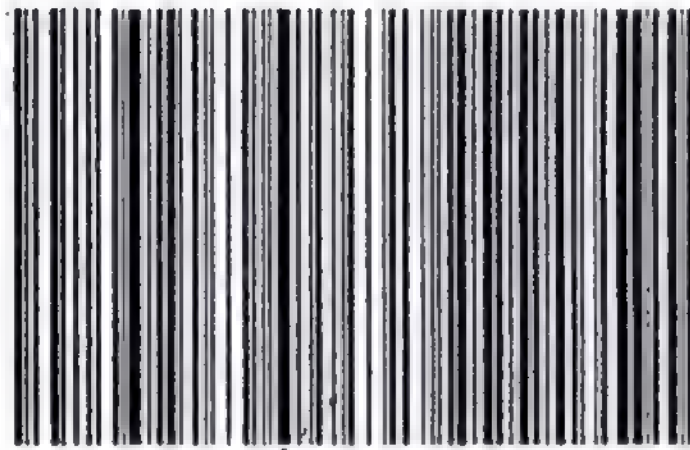
3. Slice the folded edge

4. Close the page and slip-sheet



1. Follow instructions on the other side

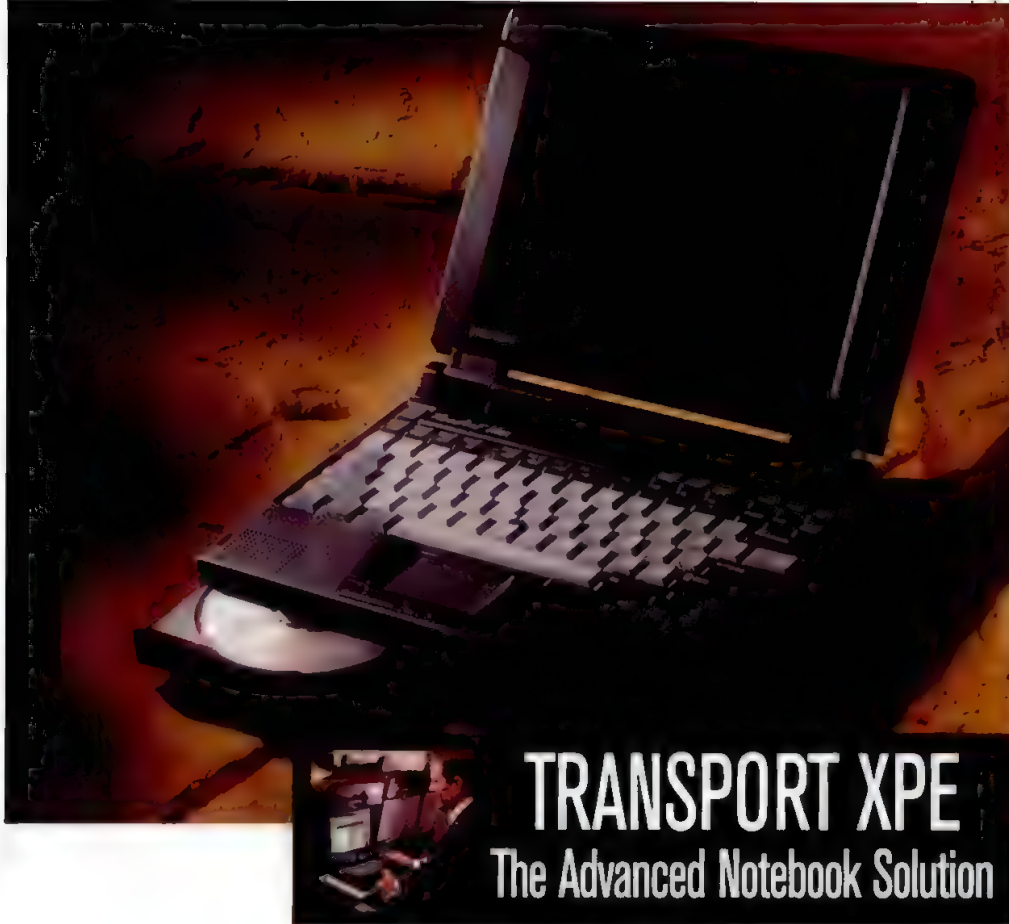
Inverted Back



Gbs5#p8ack-0018

Back

1. Follow instructions on the other side



TRANSPORT XPE

The Advanced Notebook Solution

deal for upscale business professionals who want to deliver impressive presentations, the Micron TransPort XPE is one of the most advanced notebook PCs available.

- ▶ **IMPROVE BUSINESS PRESENTATIONS** with the performance-enhancing Pentium processor featuring MMX technology.
- ▶ **REPLACE YOUR DESKTOP** with the award-winning Micron TransPort design combined with an advanced feature set that includes a 64-bit graphics accelerator, 2MB VRAM, a 12.1-inch display, an 8X CD-ROM drive and zoom video capability and a card bus that accommodates 32-bit PC cards.

TRANSPORT XPE

Mobile Intel Pentium® processor with MMX™

- Intel 430MX Mobile PCI chip set
- 256KB L2 pipeline burst cache
- 64-bit PCI graphics accelerator, 2MB VRAM
- 8X modular CD-ROM drive
- Pick-a-Point™ dual pointing devices
- Sound Blaster™16-bit stereo sound
- Built-in stereo speakers and microphone
- Motorola® Montana 33.6 fax/modem
- Card bus- and zoomed video-ready
- 2 infrared ports, 1 front, 1 rear
- S-video and NTSC-video outputs
- Built-in game port
- Management Pak: MPEG Arcade™ Player, ASAP WordPower™, Quicken® SE, SPRYNET™ Internet trial membership
- Executive Travel Pak: Greg Norman Ultimate Challenge® Golf, Quicken® ExpensAble™, LapLink®, FocalPoint™
- 2 modular expansion bays (hard drive, CD-ROM drive, 3.5" floppy drive, lithium-ion battery)
- Custom nylon carrying case
- Microsoft® Windows® 95 and MS® Plus!™ CD
- Microsoft Office CDs
- 5-year/3-year limited Micron Power™ warranty

- 150MHz Mobile Intel Pentium processor with MMX
- 32MB EDO RAM (80MB max.)
- 12.1" active matrix color display, 800x600
- 2.1GB removable hard drive

\$4,599

Bus. Inuse \$156/mo.

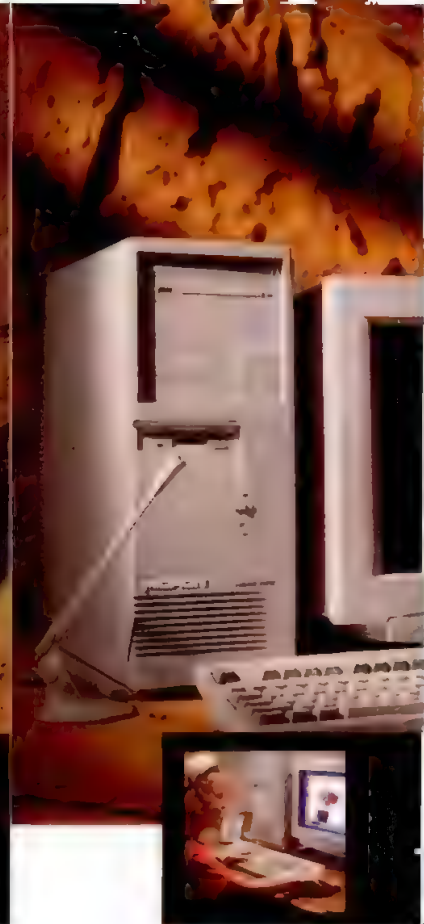
- 166MHz Mobile Intel Pentium processor with MMX
- 48MB EDO RAM (80MB max.)
- 12.1" active matrix color display, 800x600
- 2.1GB removable hard drive

\$4,999

Bus. Inuse \$170/mo.

OPTIONS

- MicronDock™ multimedia port replicator with warm docking and built-in game port
- Micron Executive desktop package
- 3Com® PCMCIA ethernet adapter, 10-base-T
- Samsonite® leather carrying case upgrade
- 2nd intelligent lithium-ion battery
- 2nd 1.4GB modular hard drive
- 2nd 2.1GB modular hard drive
- 16MB EDO RAM upgrade
- 32MB EDO RAM upgrade
- 166MHz Mobile Pentium processor with MMX upgrade
- 3GB primary hard drive upgrade
- Multimedia Xcitement Pak: POD™, Adobe® PhotoDeluxe™, Billboard Music Guide™, Blockbuster Entertainment Guide™ and Eraser Turnabout™



deal for the whole family, the Micron Home MPC P166 is an exciting home computing.

- ▶ **IMPROVE MULTIMEDIA PERFORMANCE** with the capability for vivid graphics and sharp, smooth video sound.
- ▶ **EXPLORE THE INTERNET** with a fast 33.6 Kbps modem.
- ▶ **ENJOY EXCITING SOFTWARE** bundles, including:

HOME MPC™ P166

Intel 166MHz Pentium® processor

- 512KB pipeline burst cache, flash BIOS
- 16MB EDO RAM
- 1.6GB EIDE hard drive
- 12X EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound and speakers
- 33.6 fax/modem, speakerphone, voice mail
- Microsoft® Phone telephony software
- Internet ready: SPRYNET™ Internet trial membership, Microsoft Internet Explorer™ 3.0
- America Online™ and CompuServe™ trial memberships
- PCI 64-bit 3D video, MPEG, 2MB EDO RAM
- 15" Micron 15F6x, 28dp (13.7" display)
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows® 95 and MS® Plus!™ CD
- Microsoft Works 4.0 CD
- Quicken® Financial Pak: Quicken Deluxe 6.0, Quicken Financial Planner™, Quicken Parents' Guide to Money™, Quicken Family Lawyer™ and free TurboTax™ 1996 coupon
- Family Pak: ABC by Dr. Seuss, Thinkin' Things™ Collection 1, Earthworm Jim™ and MechWarrior™ 2
- Microsoft Home Pak: Publisher Deluxe, Encarta™ Encyclopedia, Monster Truck Madness™ and CD sampler
- 5-year/3-year Micron Power™ warranty

\$1,899

With Intel 200MHz Pentium processor ... add \$200

POWER DESKTOP SOLUTIONS

MILLENNIA™ PRO2 180

Intel 180MHz Pentium® Pro processor

- Supports dual Intel 180MHz Pentium Pro processors
- 256KB internal L2 cache, flash BIOS
- 12X EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound and speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO RAM
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows® 95 and MS® Plus! CD
- ✓ 5-year/3-year Micron Power™ warranty

- 16MB EDO RAM
- 2.5GB EIDE hard drive
- 15" Micron 15FGx, .28dp (13.7" display)
- Microsoft Works 95 CD

\$2,199

Bus. lease \$75/mo.

- 32MB EDO RAM
- 3.1GB EIDE hard drive
- 17" Micron 17FGx, .26dp (15.8" display)
- Microsoft Office CDs

\$2,699

Bus. lease \$92/mo.

With 2nd Intel 180MHz Pentium Pro processor add \$599

With Microsoft Windows NT® Workstation 4.0 CD add \$99

* Second processor requires Microsoft Windows NT® Workstation 4.0

MILLENNIA™ PRO2 400 PLUS

Dual Intel 200MHz Pentium Pro processors

- 256KB internal L2 cache, flash BIOS
- PCI 32-bit Ultra SCSI Fast-20 controller
- 12X SCSI CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound and speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO RAM
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows NT Workstation 4.0 CD
- Microsoft Office CDs
- ✓ 5-year/3-year Micron Power™ warranty

- 32MB EDO RAM
- 2GB Ultra SCSI hard drive
- 15" Micron 15FGx, .28dp (13.7" display)

\$3,899

Bus. lease \$133/mo.

- 64MB EDO RAM
- 4GB Ultra SCSI hard drive
- 17" Micron 17FGx, .26dp (15.8" display)

\$4,749

Bus. lease \$162/mo.

- 128MB EDO RAM
- 9GB Fast SCSI-2 hard drive
- 21" Micron 21FGx, .26dp (20.0" display)

\$6,999

Bus. lease \$220/mo.

ADVANCED NOTEBOOK SOLUTIONS

TRANSPORT™ MRX

Mobile Intel Pentium® processor

- Intel 430MX Mobile PCI chip set
- 256KB L2 pipeline burst cache
- 8X modular CD-ROM drive
- PCI graphics accelerator, 1MB EDO RAM
- Pick-a-Point™ dual pointing devices
- Sound Blaster® 16-bit stereo sound
- Built-in stereo speakers and microphone
- 2 infrared ports, 1 front, 1 rear
- S-video and NTSC-video outputs
- Management Pak: MPEG Arcade™ Player, ASAP WordPower™, Quicken® SE, SPRYNET™ Internet trial membership
- 2 modular expansion bays (hard drive, CD-ROM drive, 3.5" floppy drive, lithium-ion battery)
- Custom nylon carrying case
- Microsoft® Windows® 95 and MS® Plus! CDs
- Microsoft Office CDs
- ✓ 5-year/3-year limited Micron Power™ warranty

- 133MHz Mobile Intel Pentium processor
- 16MB EDO RAM (48MB max.)
- 11.3" active matrix color display, 800x600
- 1.4GB removable hard drive

\$3,199

Bus. lease \$109/mo.

OPTIONS

- MicronDock™ multimedia port replicator
- Micron Executive desktop package
- Motorola® Montana 33.6 fax/modem
- 3Com® PCMCIA ethernet adapter, 10-base-T
- Samsonite® leather carrying case upgrade
- 2.1GB primary hard drive upgrade

- 2nd intelligent lithium-ion battery
- 2nd 1.4GB modular hard drive
- 2nd 2.1GB modular hard drive
- Car adapter
- 16MB EDO RAM upgrade
- 32MB EDO RAM upgrade



MICRON EXECUTIVE DESKTOP PACKAGE:
Includes matching black 17" monitor,
mouse, mousepad and keyboard

ECONOMICAL DESKTOP SOLUTIONS

MILLENNIA™ LXA P166

Intel 166MHz Pentium® processor

- 512KB pipeline burst cache, flash BIOS
- 12X EIDE CD-ROM drive, 3.5" floppy drive
- PCI 64-bit 3D video, MPEG, 2MB EDO RAM
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows® 95 and MS® Plus! CD
- Microsoft Works 95 CD
- ✓ 5-year/3-year Micron Power™ warranty

- 16MB EDO RAM
- 1.6GB EIDE hard drive
- 15" Micron 15FGx, .28dp (13.7" display)

\$1,599

Bus. lease \$54/mo.

- 32MB EDO RAM
- 2.5GB EIDE hard drive
- 17" Micron 17FGx, .26dp (15.8" display)

\$2,099

Bus. lease \$71/mo.

With Intel 200MHz Pentium processor add \$200

Micron Power™

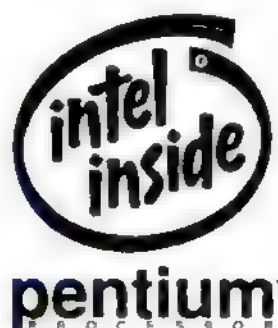


Warranty & Support

- 5-year limited warranty on microprocessor and main memory
- 3-year limited parts-only system warranty
- 1-, 2- or 3-year optional on-site service agreement for Micron desktop and server systems
- 30 days of free Micron-supplied software support for Micron desktop systems; 3 optional network operating system incident resolutions included for Micron server systems
- 30-day money-back policy
- 24-hour technical support

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- Micron Sales Hours: Mon-Fri 9am-5pm, Sat 9am-5pm (MST)
- Technical Support Available 24 Hours A Day 7 Days A Week
- Tollfree from Canada: 800-708-1758
- Tollfree from Puerto Rico: 800-708-1758
- International Fax: 208-893-7393
- International Sales: 208-893-8970



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MAKE A GREAT PC EVEN BETTER!

Custom configure your new Micron Electronics system with these popular options.

Multimedia Options

- 16-bit 3D Waveable stereo sound\$59*
- 16-bit 3D Waveable stereo soundcard w/2MB RAM\$99*
- Advent® AV270 Powered Partners® stereo speakers\$99
- Advent AV370 Powered Partners stereo speakers w/subwoofer\$199
- Microsoft® SideWinder™ 3D Pro joystick\$59
- Microsoft Side Winder game pad\$39

Storage/Media Options

- Adaptec® 2940U Ultra SCSI Fast-20 controller\$100
(upgrade from system with standard Ultra SCSI Fast-20 controller)
- Plextor™ 12P4X 12X 1.8MB/sec SCSI internal CD-ROM drive\$200**
(upgrade from systems with standard 12X EIDE CD-ROM drive)
- Iomago® Jaz™ SCSI drive with 1GB removable cartridge\$399**
- Iomago Zip™ IDE drive with 100MB removable cartridge\$99
- Iomago 6-pack of 100MB Zip cartridges\$99
- Iomago Datto™ 800 (400/800MB) Traven™ tape backup w/tape\$149
- Iomago Datto 3200 (1.6/3.2GB) Traven tape backup w/tape\$199
- Sony® 4/8GB SCSI DDS-2 DAT tape backup w/tape\$999**

Communications Options

- 33.6kb V.34 internal data/fax modem\$139***
- 33.6kb V.34 internal telephony data/fax modem w/full duplex speakerphone and voice mail\$159****

Networking Options

- 3Com® 3C509 ethernet ISA NIC (BNC, AUI & RJ-45)\$99
- 3Com 3C595 Fast EtherLink® PCI 10/100 NIC (RJ-45 only)\$159
- SMC® ISA TokenCard network card\$199

HP® Printer Options

- HP DeskJet® 690c printer—photo-quality color printing for the home, complete with cable\$369
- HP LaserJet® 5L-FS printer—affordable B&W printing, complete with cable\$449 (with ribbon)
- HP LaserJet® 6P printer—full-featured B&W printing, complete with cable\$799

Additional DeskJet/LaserJet models available. Please call for details



Software Options

EdVenture Pak: Sheila Ray the Brave, Putt-Putt® Saves the Zoo™, Reader Rabbit's Reading Development Library™ 1, Froddi Fish™ and the Case of the Missing Kalp Seeds™ and the Thinkin' Things™ Collection 2\$69
(available only on desktop and notebook systems with Windows® 95)

Quicken® Financial Pak: Quicken Deluxe, Quicken Financial Planner™, Quicken Parents' Guide to Money™, Quicken Family Lawyer™ and free TurboTax® 1996 coupon\$79
(available only on desktop and notebook systems with Windows® 95)

Display/Video Options

- 17" Hitachi® SuperScan™ 1711 (15.9" display) .26dp color monitor\$150 ††
- 21" Hitachi SuperScan 2111 (20" display) .26dp color monitor\$650 ††
- Number Nine® Imagine™ 128 series II video card w/4MB VRAM\$500 †††

TransPort® Options

- MicronDock™ multimedia port replicator: ethernet 10BT LAN adapter, SCSI-2 port, S-video and NTSC-video output, built-in stereo speakers, infrared port, headphone, microphone, line-in jacks, parallel, serial, VGA and 2 PS/2® ports (with warm dock and built-in game port—available on XPE models only)\$299
- Micron Executive™ desktop package: matching black 17" monitor (15.8" display), mouse, mousepad and keyboard (can be used with or without MicronDock)\$699
- Motorola® Montana 36.6 fax/modem supports regular telephone connections, cellular phones and two-way paging devices\$259

Service Options

- Extended 2-year on-site service coverage for desktop systems\$99
(upgrade from optional 1-year on-site service coverage)
- Extended 3-year on-site service coverage for desktop systems\$139
(upgrade from optional 1-year on-site service coverage)
- Complete on-site PC installation (call Micron Electronics™ for details)\$159

Other Options

- APC® Per7T surge suppressor\$39
- APC Pro7T surge suppressor\$59
- Microsoft Natural Keyboard®\$49
(upgrade from standard keyboard)

* Upgrade from systems with standard 16-bit stereo sound card

** Requires SCSI host adapter

*** V.34 modem includes trial memberships to CompuServe®, Prodigy® and America Online®

† Requires sound card

†† Upgrade from systems with standard Micron 17" 17FFix color monitor

††† Upgrade from systems with standard 64-bit 2MB video card

Options and accessories available with system purchase only.



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www.mei.micron.com



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x2 Downloads Nearly Twice As Fast

Introducing x2 Technology from U.S. Robotics. A revolutionary breakthrough in analog modem design that lets you download at nearly twice the speed of today's 28.8 modems.

By cutting the time you spend waiting for downloads virtually in half, x2 fundamentally changes the face of online communication.

x2 Technology Is Available Today

Any Sportster 33.6 modem purchased after August 15, 1996 is software upgradable to x2. Or you can find the Sportster that's right for you, with x2 capabilities already built in, on store shelves today.

Either way, you can start downloading nearly twice as fast with more than 100 Internet service providers supporting x2 Technology.

Building a Standard for 56 Kbps

U.S. Robotics has a long history of supporting international communications standards. And, while the ITU-T committee has not yet recommended a standard for 56 Kbps modems, we

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Limited Time Offer 2/2/97-3/29/97

Buy an x2 upgradable
Sportster 33.6 modem now, get \$40
back by mail from U.S. Robotics!
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U.S. Robotics

...a Sportster[®] with x2[™] Technology,
could download both.

are working closely with them to create one. Whatever standard is eventually established, U.S. Robotics will offer the easiest possible upgrade path.

Supported By Industry Leaders

x2 is already being supported by major chipset makers and original equipment manufacturers, as well as online services with more than 16 million subscribers. With widespread acceptance and deployment from such industry leaders as America Online, CompuServe and NETCOM, it's easy to see why x2 is setting the pace for online speed.

x2: The Right Choice For Speed

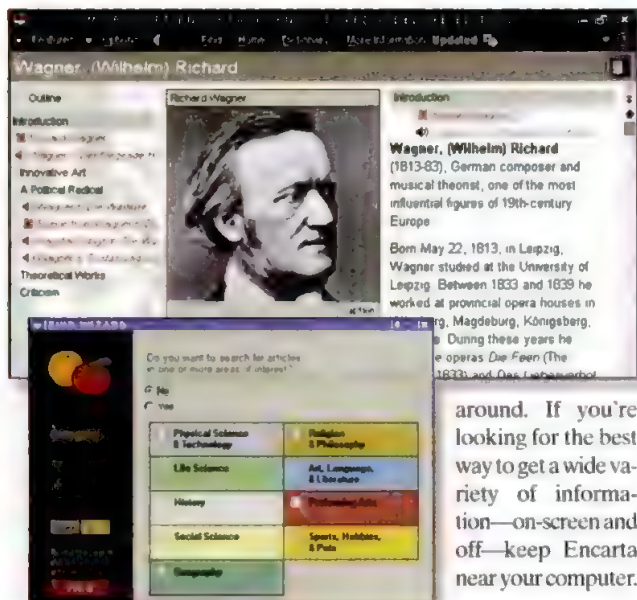
U.S. Robotics connects more people online than anyone else. Now, with x2 Technology we offer one more reason why we're the world's #1 maker of modems.

To learn more about x2, visit us at www.usr.com/x2 or give us a call at 1-800-525-USR1.

And don't wait a minute longer than necessary.



First Looks



footage of the takeoff of the Spirit of St. Louis, the London blitz, demonstrations for women's suffrage, and Jean-Bertrand Aristide's return to Haiti.

Encarta's best attribute, however, may be its well-furnished, cleanly designed user interface. The program's Pinpointer gets high marks for allowing you to explore material by topic, media type, time frame, or geographic locale. A Word Search command accepts the usual Boolean constructs, and a wizard, which you probably won't need, is available to walk you through the whole browse-and-search apparatus.

Once you've found what you're looking for, simple commands let you copy selected text or an entire article, an image or its caption, to your word processor. Because Encarta employs rich text format (.RTF) for transfers, text formatting is preserved. And when text is copied, the program automatically generates a footnote attributing the copied material to Encarta.

Encarta's appealing design is more than skin deep, and users may find themselves spending their spare time just poking

around. If you're

IBM Corp. World Book 1997 Multimedia Encyclopedia

The \$60 World Book 1997 Multimedia Encyclopedia, Deluxe Edition, produced by IBM for World Book Inc., is the first multimedia rendition of an 80-year-old family and school favorite. Delivered on two CDs, World Book includes the complete text of the 22-volume printed edition (minus a few display elements, such as foreign alphabets), along with a healthy assortment of pictures, videos, animations, sounds, simulations, maps, and virtual-reality tours.

In its electronic implementation, World Book retains its traditional pedagogic focus. Long articles include an outline, a Quick Facts box, a section of questions, and an unannotated bibliography. A three-disk academic version, designed for teachers, is also available.

Users also get a year of access to World Book's Web site where they can download archival material and get encyclopedia updates. Updates are furnished ir-

regularly but frequently, and downloading them is transparently simple: They appear as boxed sidebars that augment corresponding articles.

Microsoft Encarta 97 Encyclopedia, Deluxe Edition
Street price: \$60
Requires: 8MB RAM, 14MB hard disk space, Microsoft Windows 3.1, Windows 95, or Windows NT, or Macintosh System 7.1 or later
Microsoft Corp., Redmond, WA
206-932-0000
www.microsoft.com
Circle 418 on reader service card.

regularly but frequently, and downloading them is transparently simple: They appear as boxed sidebars that augment corresponding articles.

The program's search facilities include the usual Boolean and proximity operators, but once you've displayed an article there's no way to search within it. A Just Looking feature lets you browse particular media or subject categories and display items randomly. A must-use item is the Time Frame button, which lets you explore a topic chronologically.

You can easily annotate articles, which are kept in a list, and use them as bookmarks. A high-

When it comes to transferring material from encyclopedia to word processor, the World Book—like many of the other encyclopedias—leaves you wanting more. The only way to copy an entire article is to select it from head to foot and paste it into the word processor document; but this loses font distinctions. Images can be copied, but captions cannot, and maps arrive without their legends.

World Book's maps, however, are outstanding. Hyperlinks take you to geographically oriented articles, and overlay buttons let you switch among political, demographic, and climatic views. Musical sound clips, on the other hand, are disappointing. Performer credits are given sporadically, and World Book's editors occasionally cut directly from the selection's opening measures to its ending.

World Book and IBM have made a strong entry into the multimedia marketplace. That said, World Book 1997 Multimedia Encyclopedia needs revising before it makes it into the same class as Encarta. □



World Book 1997 Multimedia Encyclopedia, Deluxe Edition
Street price: \$60
Requires: 16MB, 18MB hard disk space, Microsoft Windows 3.1 or Windows 95
IBM Corp., Atlanta
770-944-4881
www.worldbook.com
Circle 417 on reader service card.

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See Adaptec® SCSI boost Windows NT™ performance and marvel at SCSI's true multitasking power. Watch as this action-packed duo energizes hard-drive performance. But the thrills won't stop there! Feel the excitement as Adaptec SCSI outperforms EIDE two-to-one. For more information and your copy of "PC for the Future" from Windows Sources, simply visit www.adaptec.com/nt or call 1-800-804-8866 ext. 2158. And see SCSI make NT blast off.

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First Looks

NETWORK COMPUTERS

NCs: Fact or Fiction?

Do network computers deliver lower equipment costs and lower cost of ownership?—By Carol Venezia

Unless you've been living in a cave for the past year, you've heard all of the media hype surrounding the network computer, or NC. What's all the fuss about? In short, it's about lowering the costs of computing.

In an effort to promote computers that are cheaper to buy, install, and maintain than today's PCs, Oracle introduced its Network Computer Reference Profile, which defines a simple client machine—one lacking local storage—that would be cheaper to purchase and maintain than a standard PC.

On the hardware side, NCs must support text input, audio output, at least VGA-level reso-

like a Microsoft Windows 95 PC.

Because these machines have no local storage or software, they must boot either from local flash memory or from the network; the HDS machine must boot from an installed PC Card hard disk or from the network. To get on the network, we first plugged in a cable and told each NC the server's IP address. We equipped our server with Citrix's WinFrame for Terminals, a multiuser version of Windows NT Server that is widely used for terminal access to Windows applications. Once this software was installed, both Wyse and NCD systems could talk to the server right away. But we had to install additional server software to get the Boundless and HDS NCs to work.

Although none of these NCs will break any speed records, all were quite adept at running Windows applications off the server. Not surprisingly, on anecdotal tests desktop performance quickly degraded with an increase in network traffic.

These NCs live up to the promise of easier installation, but not all are cheaper than PCs. None claim to be PC replacements, but if you're looking for an inexpensive answer to a vertical-market question, the NC may be the solution.

Boundless Technologies **Boundless Network Computer XL**

X-terminal vendor Boundless Technologies (formerly Sun-River Data Systems) makes its debut in the NC market with the Boundless Network Computer

XL. In addition to this midrange NC, Boundless offers the low-cost Network Computer TC and the high-end Network Computer XLC.

Except for the Winterm 2700—which has a single monitor/CPU unit—the XL is the smallest system in this roundup. At just under five pounds and measuring just 1.8



The Boundless Network Computer XL.

by 9.8 by 9 inches, this system is small partly because of its external AC adapter brick.

Powered by a 25-MHz Intel i960 RISC processor, the XL also features 16MB of RAM and 4MB of flash memory, which the machine needs to boot. To set up the XL to boot from a server, you must install xEasy or ntEasy, the vendor's server software. In order to hook the XL to our Citrix server, we had to install WinCenter Connect as well.

The XL features one parallel, two serial, a VGA-out, mouse, and keyboard ports; there are also twisted-pair and coaxial connectors. The system has integrated 16-bit digital audio support and a headphone jack but no speakers.

When running Windows applications, the XL was competitive with the other NCs we tested. We were able to access documents relatively quickly, save large files without a hitch, and work with multiple windows.

If your needs call for a small, low-cost NC, the Boundless Network Computer XL is a great choice. **Boundless Network Computer XL.** Street price: \$1,100. Boundless Technologies, Austin, TX; 800-231-5445, 512-349-5800; www.boundless.com. Circle 410 on reader service card.

HDS Network Systems Inc.

@workStation Supra-66

HDS Network Systems' @workStation Supra-66 is a performance-oriented NC that takes a slightly different approach to network computing. Although this machine was one of the more capable and impressive NCs we looked at, it's not cheap. At \$2,699 (direct), the @workStation is not only the most expensive NC here, its price rivals that of a fully loaded Pentium/200 PC.

Housed in a sturdy enclosure reminiscent of workstation pizza-box designs, the Supra-66's motherboard features a 66-MHz Intel i960 RISC CPU and 32MB of system RAM. A riser card holds a snap-in audio/video card and a PC Card drive (our unit had a 40MB disk installed).

Unlike the other NCs we tested, HDS's unit has its own interface, called netOS, which allows the machine to look and operate like Windows 95. NetOS features integrated PostScript and Java applet viewers, as well as single-click links to browsers and sessions on other hosts. With netOS (which must be installed on the Windows NT server), we were able to connect to an IIS server using the system's integrated browser.

Once the system was connected, we accessed and used Windows applications without a



HDS's @workStation Supra-66.

problem. The @workStation we tested had some enticing options, including a 40MB Western Digital Caviar Ultra Lite PC Card hard disk. The @workStation also features audio-in and -out jacks, connectors for thin, thick, or coaxial cabling, a Sun key-



NCD's HMX Network Computer.

lutions, and IP network connections. For software, an NC must support Java, communicate over the network via the IP protocol and maintain a TCP/IP stack, run a Web browser, and recognize certain basic file formats.

Of the four network computers that we look at here, only one—NCD's HMX Network Computer—fully meets the NC Reference Profile. Given that NCD is an alliance partner with Oracle, this makes sense. Boundless Technologies is a partner as well but their products lack Java support.

Others are promoting the idea of inexpensive alternatives to today's PCs. One—Wyse Technology—is a leading advocate of the Windows terminal. We also tested an NC from HDS Network Systems that—with its own custom-built GUI—looks a lot

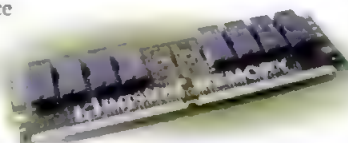


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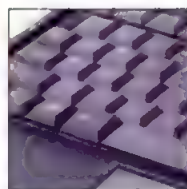
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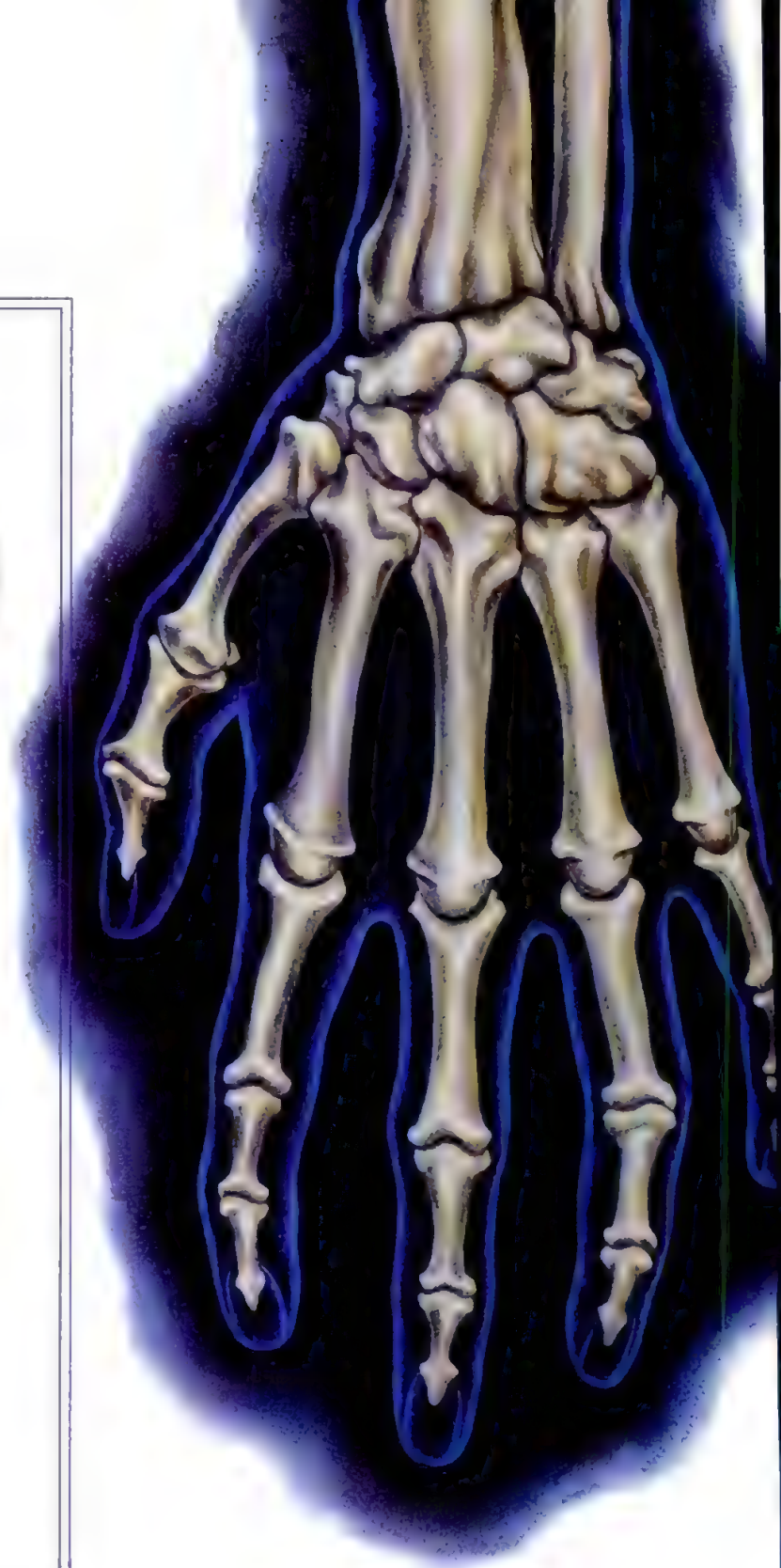
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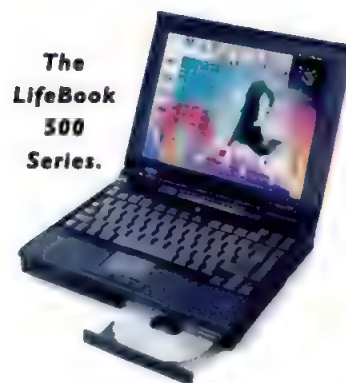


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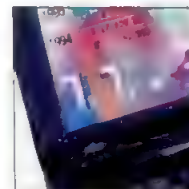
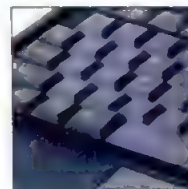
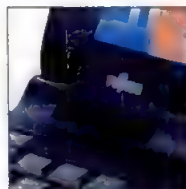
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First Looks

board connector option, and parallel and serial ports.

This machine was quite adept at running Windows apps, but it was the slowest of the group to boot and log onto the server.

@workStation Supra-66. Direct price: With 15-inch monitor, \$2,699. HDS Network Systems Inc., King of Prussia, PA; 800-437-1551, 610-277-8300; www.hds.com. Circle 411 on reader service card.



Wyse's Winterm 2300T.

Network Computing Devices Inc.

HMX Network Computer

Of the NCs reviewed here, we were most impressed with NCD's HMX Network Computer, whose features and functionality make it most like the PC on your desk. Trouble is, it also comes with a price tag like that of a desktop PC. The unit we tested sells for about \$2,330 (street), a price which doesn't include a monitor. The vendor also sells an Explora line of lower-cost systems.

Like HDS's system, the HMX has a case that's shaped like a classic Unix workstation and supports a monitor. The machines boasts the most powerful processor here in terms of clock speed: an 80-MHz MIPS R4600, coupled with 24MB of system memory. The HMX's memory expansion capabilities are also the best here: With four SIMM sockets, it can hold up to 136MB.

Inside the box, you'll find this group's most impressive audio subsystem. With an integrated audio chip set and internal speakers—plus audio-in and -out jacks on the rear of the case—you'll be able to run full-motion video right out of the box. Sample video clips that we ran were acceptable, with minimal choppy-ness due to dropped frames.

The HMX also features an internal power supply and a

power connector for the monitor. To hook the system up to your network, there are thin co-

axial and twisted-pair connectors; a Token-Ring option is also available. Connecting to our WinFrame server was easy: We powered up the machine, plugged in a cable, and told the NC the IP address of the server. (WinCenter Connect must be installed on the

server so the system can boot.) Once the HMX was connected, we were able to access all Windows applications on our server easily.

Of the five systems here, we found the HMX to be the speediest at opening and closing documents, saving large files, and running multiple program windows simultaneously. And on our Graphics WinMark tests, the HMX placed ahead of its competition. To exploit the capabilities of the system fully, you should install the server-side software—NCDware—which supports MPEG-1 decompression and optional plug-ins for OpenGL, 3-D graphics, and Display PostScript.

For power and multimedia, the HMX Network Computer delivers, but at a price that would get you an equally nice PC.

HMX Network Computer. Street price: \$2,330. Network Computing Devices Inc., Mountain View, CA; 800-866-4080, 415-694-0650; www.ncd.com. Circle 412 on reader service card.

Wyse Technology Inc.

Winterm 2300T, Winterm 2700T

Wyse Technology offers two slightly different approaches to thin-client computing on a budget: the Winterm 2300T and Winterm 2700T. The Winterm 2300T is a standalone CPU attached to a monitor; the 2700T takes the

monoputer idea one step further by completely integrating the CPU into its 15-inch monitor.

Unlike the other NCs here, the Wyse machines operate strictly from 1MB of flash RAM; neither machine uses main-system memory. This partially explains why, when working with Windows documents, the Wyse systems were slower than the other NCs in this roundup. Furthermore, neither system is upgradable.

The Winterm were, however, the easiest of the bunch to set up. Just plug them in, identify the IP's server address, and fire up. WinFrame, Insignia's NTrigue, NCD's WinCenter Pro, Tektronix's WinDD, or other ICA3 systems. Unlike the others NCs we reviewed, the Wyse units don't require additional software to connect to WinFrame.

The Winterm 2300T is the smallest machine we reviewed; it's about the size of a hardback novel (2.4 by 8.9 by 6.9 inches). One annoying design trait is that its

power switch is situated right on top of the unit, so it's easy to hit it accidentally while walking by.

With their integrated 10Base-T adapters, the Winterm are ready to plug into your network. But unlike other vendors' NCs, the Winterm do not afford options for different types of cabling. Both, however, integrate all standard ports, including keyboard and mouse, one parallel, and two serial connectors.

If you're looking for small, low-cost NCs that provide access to Windows NT, Unix, and terminal applications—and you're willing to put up with the resulting performance hit—the Wyse Winterm may be the machines for you.

Winterm 2300T. Street price: \$690. **Winterm 2700T.** Street price: \$870. Wyse Technology, San Jose, CA; 800-438-9973, 408-473-1700; www.wyse.com. Circle 413 on reader service card.

Kevin Young contributed to this report.

PERFORMANCE TESTS

Network Computers

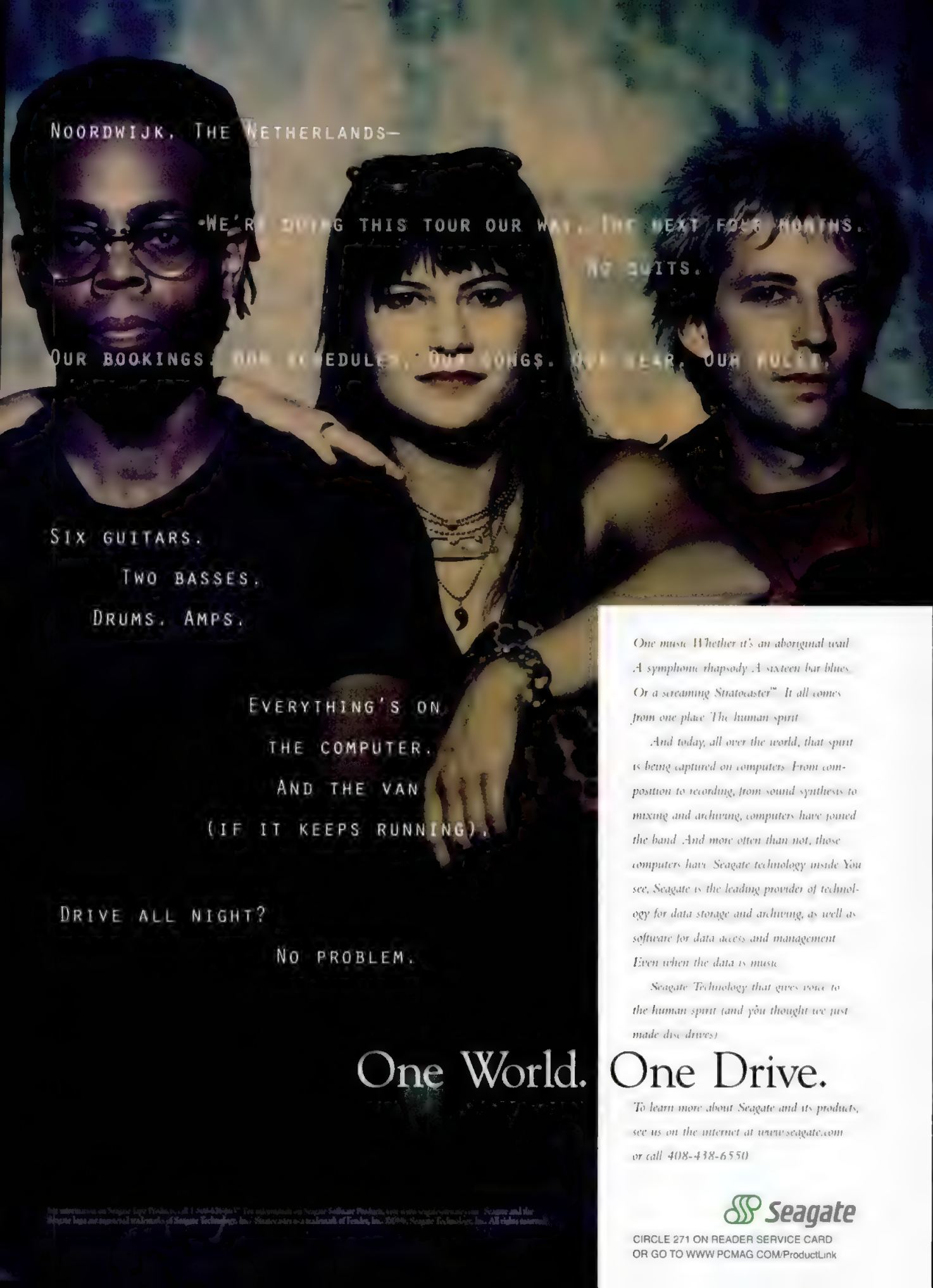


Most of the network computers we tested produced acceptable results when used on their own, but when we added more clients to the network, performance rapidly deteriorated. Not surprisingly the following machines excelled: the NCD HMX Network Computer (80-MHz MIPS CPU and 24MB of RAM), the HDS @workStation Supra-66 (66-MHz RISC CPU and 32MB of RAM), and the Boundless Network Computer XL (25-MHz i960 CPU and 16 MB of RAM). At the other end of the spectrum were the Wyse Winterm units. By contrast, a typical Pentium/200-based desktop PC scores about 45.

We tested on a 10-Mbps Ethernet network. All the NCs were attached to an HP NetServer 5/66 with 64MB of RAM and two 1GB hard disks.

	Standalone Score	Simultaneous operation Score	ZD Business Graphics WinMark 97
Boundless Network Computer XL	18.4	4.0	
HDS @workStation Supra-66	18.5	3.7	
NCD HMX Network Computer	15.3	3.9	
Wyse Winterm 2300T	5.8	2.6	
Wyse Winterm 2700T	5.8	2.7	

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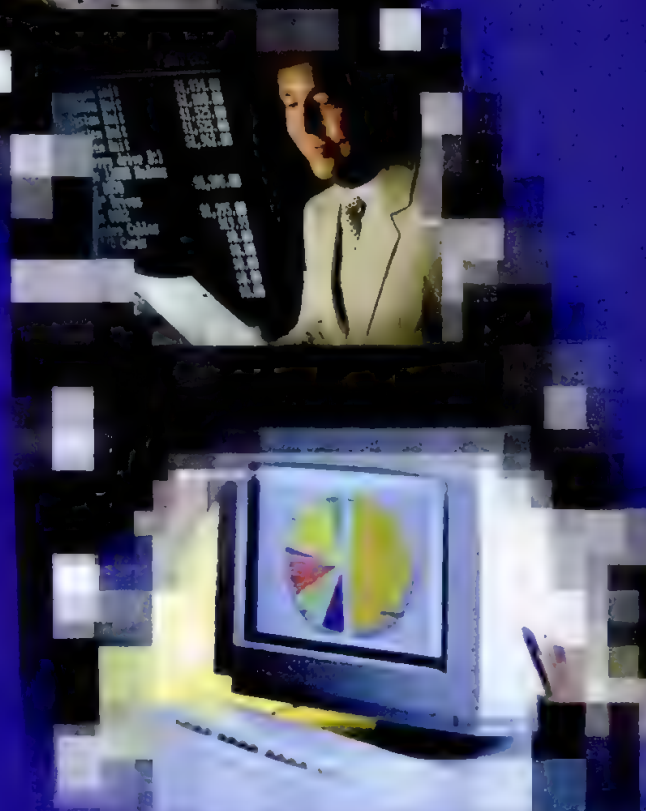
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First Looks

GROUPWARE

Notes Takes On the Net

Lotus Notes is reincarnated as the Domino 4.5 Web server.—By Tony Pompili

Lotus Notes redefines itself with each new release. The most recent iteration presents a mesmerizing array of features to satisfy loyal Notes patrons and Internet enthusiasts alike. As expected, Lotus Development Corp. has integrated Notes with its popular Domino server (First Looks, October 22, 1996), meshing Notes' powerful groupware tools with the Internet/intranet.

Officially called Domino 4.5, Powered by Notes, the program looks and feels like a combination of a Notes server and the Domino 1.5 HTTP server. The resulting Domino 4.5 represents Lotus's effort to embrace the brave new world of the Internet. To its credit, Lotus mostly succeeds.

A single-processor Domino server now costs \$1,000, and symmetrical multiprocessor (SMP) licenses cost \$3,000. With the exception of the new Calendaring and Scheduling views and the beefed-up internal browser, the Release 4.5 client is basically unchanged at the interface level from its 4.12 predecessor; much of what's new in the latest client goes on

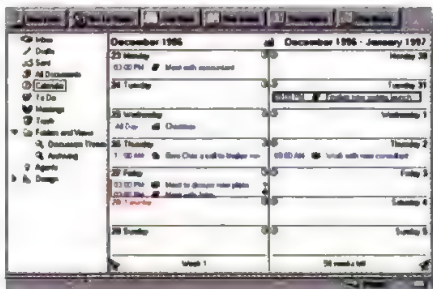
behind the scenes. There's better management of Web pages, Internet-standard mail support, including POP3 and SMTP/MIME, and improved server redundancy and scalability via server clustering.

Lotus has preserved its strong crossplatform scope with Notes 4.5 by shipping client versions for Microsoft Windows 3.1, Windows 95, Windows NT, OS/2 Warp, and Macintosh System 7.5. On the Domino server

side, there are Dominos for NetWare, OS/2 Warp Server, Windows 95, and Windows NT 4.0. Unix client and server versions for a variety of platforms are also available. We tested the Notes 4.5 client on a 200-MHz Pentium Pro running Windows 95 and the Domino 4.5a server on a 100-MHz 486 PC running Windows NT Server 4.0.

Lotus continues to refine Internet functionality for both Notes clients and Domino servers. Notes users can access the Internet directly from their workstations; previous versions of Notes used the InterNotes server process as the proxy or gateway server. Like its predecessor, the Notes client includes basic browser features via Action Bar buttons for reload, jump to previous page, and other common

browsers. Notes 4.5 converts documents between HTML and Notes internal format on the fly and stores updated data in Notes .NSF databases. Notes also includes a new routine that makes it easy to share a good Web site. By pressing the Share



button on the Action Bar, you can send the URL to another user. Since Notes parses document text and identifies URLs automatically, the recipient can click on the identified URL and Notes automatically connects to the Web site. You can also send the entire Web page, complete with links and .GIFs.

Of course, Notes 4.5 allows you to build Notes applications that can automatically connect to Web sites using built-in Notes @ functions. This lets you create a button, for example, that connects you to a Web

site. So you don't have to start from scratch, Notes 4.5 includes a browser application, called the Personal Web Navigator 4.5, for storing Web pages and agents. This database gets created automatically when you select the workstation-based Internet access, so it's easy to set up.

The Personal Web Navigator database includes two useful client-based Notes agents for automatically combing the Web and updating your Web pages in the

background. The Web Ahead agent retrieves a selection of Web pages automatically and lets you specify how many links you want. A second agent, Page Minder, automatically sends you e-mail when a specified site is updated.

The HTTP server process lets a Domino server act like a standard Web server, with the added benefit of being able to convert Notes applications to HTTP on the fly. This newest version of the HTTP server includes closer ties

OLD, NEW: The powerful new Calendaring and Scheduling view is based on the trademark Organizer interface. to the Notes applications, with support for such functions as DBColumn and DBLookup, which adds dynamic, relational database-like functionality to Web applications.

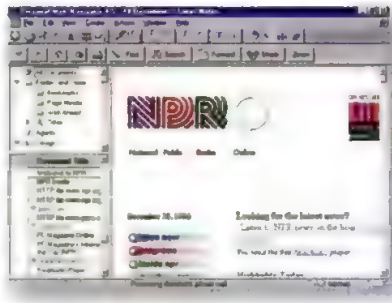
Domino exploits Notes' trademark access control to provide security on a database level. For security, Domino servers support basic password and user-name access control as well as secure socket layer. For tighter security, Domino servers also support RSA-based certification and recognize certificates from third-party authorities.

Lotus is determined to be a one-stop shop on the server-messaging side. Domino ships with not only a POP3 mail server for generic clients, such as Qualcomm's Eudora, but SMTP/MIME and cc:Mail mail-transfer agents for converting and routing mail among the various formats.

One of the most welcome additions is customizable views. The views can include navigational icons and other components, as well as the dynamic outline-like listing of selected Notes documents. Domino can also serve up Calendaring and Scheduling (C&S). Based on Lotus's Organizer package, this new view type (month, two-week, week, and daily Calendar views) looks like a table with hot links to events.

WEBWARE:

Release 4.5 lets you manage and even share Web addresses with your colleagues as if the addresses were regular databases.



functions. Because Lotus attempted to shoehorn the browser interface into the existing Notes desktop, it is less intuitive than Microsoft Internet Explorer or Netscape Navigator—both of which you can use with Notes 4.5. If you do, though, you'll miss out on some of the strongest Notes client Web features.

Lotus has given the Notes client special capabilities not found in current standalone

While C&S is a welcome addition for Web users, the Web version pales in comparison to C&S on Notes. From the Notes 4.5 client you have greater flexibility in manipulating Notes C&S objects, including the ability to drag and drop to reschedule events. Since the Calendar view is implemented as a Notes view type, you can customize it and incorporate it into your own applications with a little bit of development work.

While the Domino interface is impressive, the back-end group scheduling and free-time lookup really make Notes C&S tick. A server task constantly updates a central database that keeps track of when a user is busy. When a person attempts to schedule an event, the Domino server's Busytime looks for conflicts. C&S is not limited to Notes users but works with Organizer and IBM OfficeVision user files as well.

MISSION-CRITICAL NOTES

For administrators, new Domino options make it possible to provide a degree of fault tolerance as well as manage multiple Domino servers on a single machine. Called Advanced Services, this \$1,000 option includes

Domino server clustering—a new Release 4.5 feature—which lets you group up to six servers. Should a server go down, the Notes 4.5 client automatically reconnects to another server and reopens the application the user was working on when the crash occurred. Clustered servers keep real-time replicas, minimizing data loss in the event of a server outage. Advanced Services also includes a couple of features useful to ISPs. One is a billing and user-tracking module; the other is partitioned servers, which allow an ISP to host more than one Domino server on a single machine.

To pull it all together, Notes and Domino ship with one of

Making Your Site Smarter

Aestiva Overlays 1.2 (www.aestiva.com) supercharges simple HTML Web applications with sophisticated programming horsepower. A combination of a server-based process and an off-the-shelf Web browser, Aestiva Overlays' simple HTML extensions give you better application control with streamlined yet powerful scripts and functions.

The product uses an extended HTML tag set—called Otags—to perform a variety of functions, from storing a variable value to displaying the current time. Since Aestiva Overlays is session-oriented, you can

capture and use values across one or several HTML pages. For example, you can store a user's name in an Otag variable and display it later on HTML pages viewed by that user. Otag functionality ranges from string manipulation to arithmetic and table-manipulation functions.

Otags also add powerful if/then options, enabling you to create applications that, for example, link newcomers to a new-user registration page and send registered users directly to other parts of your site. And since Aestiva Overlays is serving as a go-between for the HTML code and the Web server, it offers a layer of security not normally found with standard Web servers.

the first in a series of wizards, or—in Lotus lingo—Actions. Domino.Action guides you through the process of building a Web site, allowing you to pick designs and even set up a modest workflow and registration system. The completed application is simply a Notes database that runs on Domino. Lotus expects to unveil a series of such Action applications and plans to license them to ISPs as value-added enhancements.

With its impressive array of Internet and C&S enhancements, Notes continues to grow in scope and usefulness with Release 4.5. While Notes is clearly shedding its proprietary skin, it retains some weaknesses. Com-

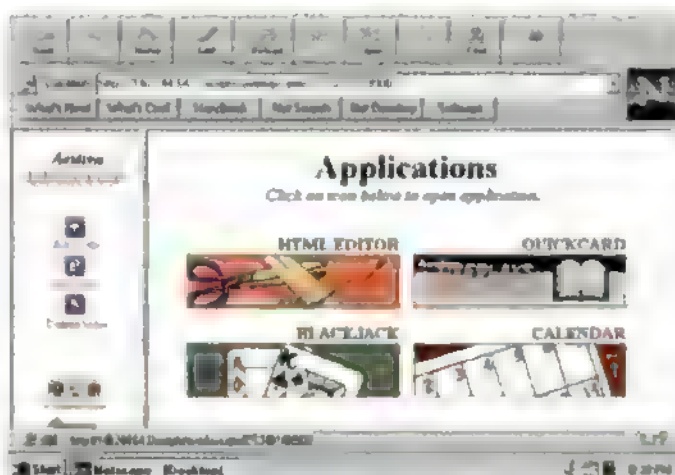
Otags are embedded directly into Web pages using an HTML-like syntax. The key to making Otags work is the Aestiva Overlay server process, which interprets Otags and generates the actual HTML on the fly. Running on Microsoft Windows NT or Unix, the Aestiva Overlays server process is compatible with any CGI HTTP server. You can create

Otag HTML pages with any authoring tool, such as Netscape Navigator Gold or Microsoft FrontPage. Aestiva Overlays' desktop provides basic file-manager and file-manipulation tools.

We tested Aestiva Overlays on Windows NT 4.0 with Microsoft's Inter-

net Information Server 2.0. We installed it ourselves; the process was straightforward. But Aestiva will install the program for you if your server is accessible from the Internet and you're running an FTP server.

Aestiva Overlays costs \$799 per server, including remote installation via FTP. For those with basic programming or scripting experience and a little HTML coding under their belts, it is simple to use. Great for collecting basic data, personalizing Web visits, and providing such dynamic elements as date, time, and user name, Aestiva Overlays' painless installation and low server overhead make it a welcome addition to any site.—TP



plex setups, especially in multi-server and Internet environments, can be a little frustrating and unmanageable for some users. Setting parameters in location documents and preferences can also be difficult for new users and administrators.

While Lotus is taking its groupware applications and building in Internet functionality, Netscape is busy doing the opposite. The latest release of Netscape Navigator, now part of a Communicator suite, includes POP3 and IMAP4 messaging, but it can't rival Notes for comprehensive groupware functionality.

Release 4.5 clearly demonstrates that Lotus intends to

make its groupware mark in the Internet world. The elegant marriage of Notes' powerful groupware with easy Internet access and functionality will appeal to both Internet jockeys and traditional groupware users.

Domino 4.5, Powered by Notes. Street price: Server, \$1,000 (single CPU); \$3,000 (SMP); Advanced Services, \$1,000. Requires: 64MB RAM, 300MB hard disk space, Microsoft Windows 95 or Windows NT, or NetWare, or OS/2 Warp Server, or AIX or HP-UX. Lotus Development Corp., Cambridge, MA; 800-346-1305, 617-577-8500; www.lotus.com. Circle 409 on reader service card.

First Looks

IMAGE EDITING

Photoshop Catches Up

Adobe's fourth-generation image-editing program shows that small changes have a huge impact. —By Luisa Simone

Photoshop 4.0 is Adobe's response to the technological innovations of competing products. The \$895 image-editing program offers a host of new features that push the power of layers, reduce cumulative processing error, speed the display of high-resolution images, and automate repetitive tasks. All told, this is the fastest, most flexible, and easiest Photoshop yet.

In addition to performing compositing chores, Photoshop editing layers can be used to apply image-enhancement filters in a nondestructive manner to those layers lower in an image's stacking order. And as with any other layers, you can specify transparencies, change blending modes, or use painting tools to create masks.

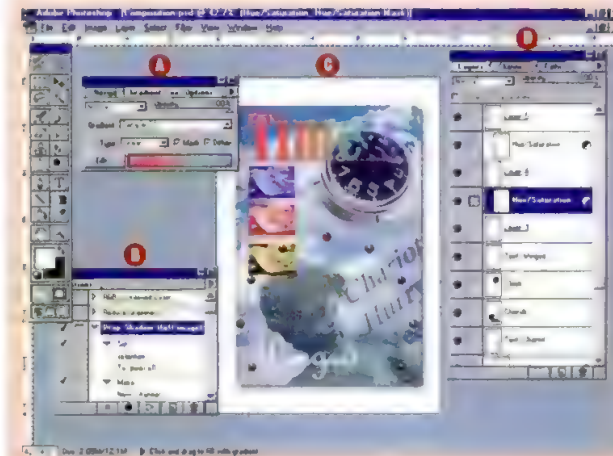
UNLIMITED UNDO

Best of all, each filter remains live, so you can fine-tune an effect or delete the layer altogether. The result is essentially unlimited adjustments and the ability to undo any effect at any time.

The new Free Transformation function preserves image quality by letting you apply a series of rotations, skews, resizes and distortions to a preview proxy image; only when you're finished does Photoshop apply them to the stored image. A big bonus is that Photoshop concatenates your changes, reducing iterative errors.

For quick screen updates, Photoshop's image-caching lets you display a low-resolution proxy while applying your edits to a high-resolution version of the image. And the new Actions palette lets you record Photoshop operations as you work.

The seemingly small additions to Photoshop's toolset have a big payoff. The gradient editor, reminiscent of KPT's Gradient



LAYER CAKE: Photoshop's advanced layering lets you stack image-editing commands and filters.

- A** Photoshop's gradients can now include multiple colors and transparency.
- B** We used the Action palette to create the vignetted drop shadow around this entire image.
- C** Moveable guidelines help to align elements in this complex composition.
- D** The highlighted layer is an adjustment layer that is grouped with the layer beneath it. Clicking the circular icon invokes the Hue/Saturation dialog box.

Designer, lets you create multi-color transitions that include transparencies. In addition, user-defined grids and movable guides make it easy to position elements accurately, even when working in a zoomed-out view.

Photoshop's polygon tool lets you quickly create irregularly shaped, straight-edged selection areas. The cropping tool's bounding box is now adjustable and can straighten a crooked scan. And you can now circumvent Photoshop's all-too-common memory-error messages by purging data from the Clipboard, undo, pattern, and snapshot buffers.

Creating complex compositions is easier than ever, thanks to functions that work hand in hand with layering. Operations that previously created floating selections on the current layer now automatically generate a new layer. In addition, the layers themselves behave more like objects, so that you can, for example, move and

retrieve image data from beyond the confines of the canvas.

Photoshop's interface is more logical, and the tools are better behaved. The selection tools now move only the selection borders. All the tools, including the path-

also demo versions of plug-ins from AlienSkin, Altamira Software, Andromeda, Extensis, and MetaTools.

WEB-READY, SORT OF

This version of Photoshop adds export options for Web publishing. In addition to .GIF 89a, Photoshop now exports progressive JPEG, progressive PNG, and Adobe .PDF formats. It even offers a common 8-bit Web palette for color-reduction purposes. The program can't, however, attach URLs to an image, and there are no advanced functions for weighting a color palette or reconciling conflicting palettes.

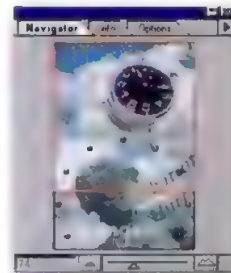
Our most serious disappointment concerns Photoshop's lack of standard color-management tools. Kodak's CMS (and the related support of ICC profiles) is available only when you are acquiring a PhotoCD image; all other color-conversion and color-matching tasks rely on Photoshop's proprietary calibration routines and color-lookup table, or on third-party plug-ins.

Photoshop 4.0 doesn't contain any technological breakthroughs. In fact, many of the program's new features have been available for some time in Live Picture (on the Mac), PicturePublisher, and xRes. That said, the features

themselves have been thoroughly and intelligently integrated with Photoshop's core toolset, proving that you don't have to be among the first to be among the best.

Adobe Photoshop 4.0. List price: \$895; upgrade, \$149. Requires: 16MB RAM, 20MB hard disk space, Microsoft

Windows 3.1, Windows 95, or Windows NT 3.51 or later. Adobe Systems Inc., San Jose, CA; 800-492-3623, 408-536-6000; www.adobe.com. Circle 408 on reader service card.



SPEED THE FLOW: The Navigator lets you work with a low-resolution version of your image.

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First Looks

INTERNET SOFTWARE

FTP Sets Your Files Free

These three inexpensive FTP-server daemons let you share files with the world.—By Neil Randall

Downloading and uploading files across the Internet is such an essential chore that FTP (File Transfer Protocol) was in place even before e-mail arrived on the Net. But using FTP to access another computer's files is simpler than allowing other users to access and retrieve your files. For that you need an Internet connection—preferably one with a fixed IP address—and a piece of software called an FTP server or FTP daemon.

If you're serious about FTP serving, you should try one of these daemons: Cat Soft's Serv-U 2.1, Jgaa's War FTP Daemon, or Texas Imperial Software's WFTPD 2.31. All three are available (via FTP, of course) from such popular download sites, as www.tucows.com and www.windows95.com.

The secret to a good FTP server is the ability to control access according to users and file types. If you have publicly available files, you'll also want the option of allowing anonymous FTP access to particular directories. If you're the administrator of an FTP site, you also need a complete access log. And you'll want to be able to do all this via an intuitive, usable interface.

Truth is, all three of these products are good FTP server options, and you should take advantage of their free trial periods to try them yourself. But for most users, we recommend Serv-U, because it strikes a good balance between WFTPD's ease of use and War FTP's comprehensive and powerful features.

Cat Soft Serv-U

Serv-U blends a powerful feature set with an easy-to-use interface. Now in version 2.1, Serv-U offers a logging screen that's easy to read, a user-information box that not only tracks users' activity but also lets you selectively disconnect them, and a set of extensive configuration dialog boxes.

With Serv-U, you can give each user the right to download, upload, delete, or execute a file, and the right to list, create, or delete directories. Serv-U also lets you have all of a directory's subdirectories inherit its access rules; this is a handy feature when setting up a site that has many users.

Another convenient feature allows you to establish password-protected groups of users. Serv-U's features list almost rivals that of War FTP. And if you're administering a busy site, Serv-U lets you allow specific individuals access even if the number of users has reached its limit.

Serv-U 2.1. List price: \$25.

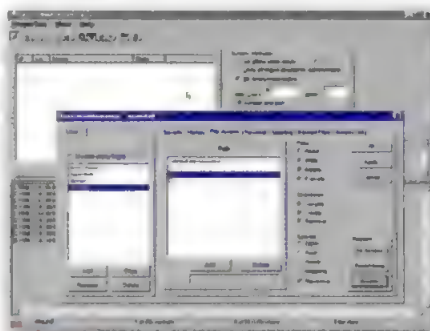
Requires: 8MB RAM, 1MB hard disk space, Microsoft Windows 3.x, Windows 95, or Windows NT. Cat Soft; www.cat-soft.com. Circle 405 on reader service card.

Jgaa

War FTP Daemon

Of the three servers reviewed here, War FTP Daemon offers the most attractive interface and the greatest wealth of configuration options, but it can be complex to configure.

Setting up new users is very easy, as is assigning passwords. But restricting access to specific directories can be demanding, even when using the simple options dialog box. With the advanced options dialog box, there are so many choices that it's easy to get lost. But



WARTIME: Jgaa's War FTP Daemon has the most extensive server-configuration options.

War FTP is free, and it also provides a variety of options. You can establish a hierarchy of access permissions, including a basic default and increasingly specific class, group, and individual rights.

You can configure War FTP to reject or accept the uploading of certain file types. And if you're setting up a BBS-style file-sharing system, you can require a certain ratio of uploads to downloads. You can track online users via the aptly named Spy button, and you can deny access by user or IP address.

The learning curve may

be a little steep, but for power users, War FTP Daemon is the FTP server of choice.

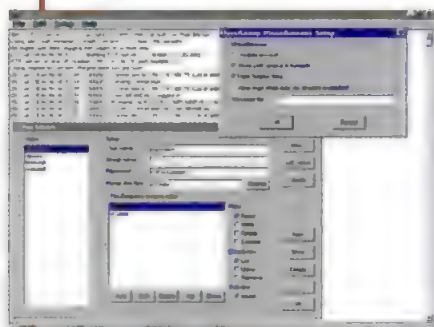
War FTP Daemon. List price: Free. Requires: 8MB RAM, 5MB hard disk space, Microsoft Windows 3.x, Windows 95, or Windows NT 3.51 or later. Jgaa; www.jgaa.com/tftpd.htm. Circle 406 on reader service card.

Texas Imperial Software WFTPD

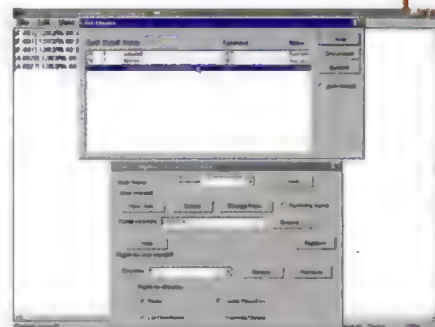
WFTPD is a popular FTP server in large part because it is so easy to configure.

To get WFTPD going, just fire up the program and use the Security menu to set up user names and passwords. You can select from four types of access to any directory: read, write files/create directories, list directories, and delete/overwrite. For example, you can give anonymous FTP accounts access to only one directory and allow them to download its files but not upload or delete anything.

It's equally easy to restrict access to specific IP addresses. WFTPD logs activity at your site, including log-ons (anonymous or otherwise), downloads, uploads, and commands. **WFTPD 2.31.** List price: \$20. Requires: 8MB RAM, 1MB hard disk space, Microsoft Windows 95 or Windows NT. Texas Imperial Software; 512-257-2578; www.abol.com/texas/index.htm. Circle 407 on reader service card.



AT YOUR SERVICE: Serv-U lets you set up a group of users with its own access rights.



EASY AS FTP: Setting up users with WFTPD is simple and intuitive.



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First Looks

GRAPHICS BOARDS

TV Takes On Text

A hot 3-D accelerator board and a TV tuner produce the latest in graphics and video.—By Bruce Brown

At less than \$330, the combination of STB's Velocity 3D graphics accelerator and the STB TV PCI tuner can turn your PC into a media powerhouse by mixing Intericast data with the Web and television programming.

Based on S3's ViRGE VX graphics controller, the Velocity 3D board comes with 4MB of EDO VRAM. A 220-MHz RAMDAC supports vertical refresh rates of up to 160 Hz, and the board can handle resolutions of up to 1,600 by 1,200. The Velocity 3D supports 64-bit 2-D acceleration and 3-D rendering with Microsoft Windows 95 Direct3D drivers. Its 64-bit digital video engine can play full-screen MPEG-1 and MPEG-2 video.

Tested in a Pentium/75 Gateway 2000 Family PC with 24MB of RAM, the Velocity 3D was an average performer. The card's ZD Business Graphics WinMark 97 scores were 22 at 800-by-600 resolution with 256 colors and 22 at 800-by-600 resolution with 64,000 colors.

The \$129 STB TV PCI tuner, based on the Brooktree 848 video and PCI controller, uses a Philips FR1236 TV tuner and a Dolby stereo decoder. Its video-input sources include S-video, composite video, TV antenna, and cable. The TV PCI worked well with the Velocity 3D board and other vendors' products that use Cirrus Logic 5446, ViRGE, or ViRGE VX video chip sets, including those from ATI Technologies, Diamond Multimedia Systems, and Matrox. We used the card's 122-channel tuner to watch TV and found that the pop-up on-screen remote control gave access to a variety of video and audio recording features.

You can scale the TV image to

any size from thumbnail to full-screen and change the window's position by dragging it. Other features include closed captions

it to a full-screen image.

The real step forward is the integration of the Intel Intericast Viewer. Intericast combines television programming with Web-style pages that contain live URLs and such information as stock market prices; you can jump to any URL just by clicking on it.

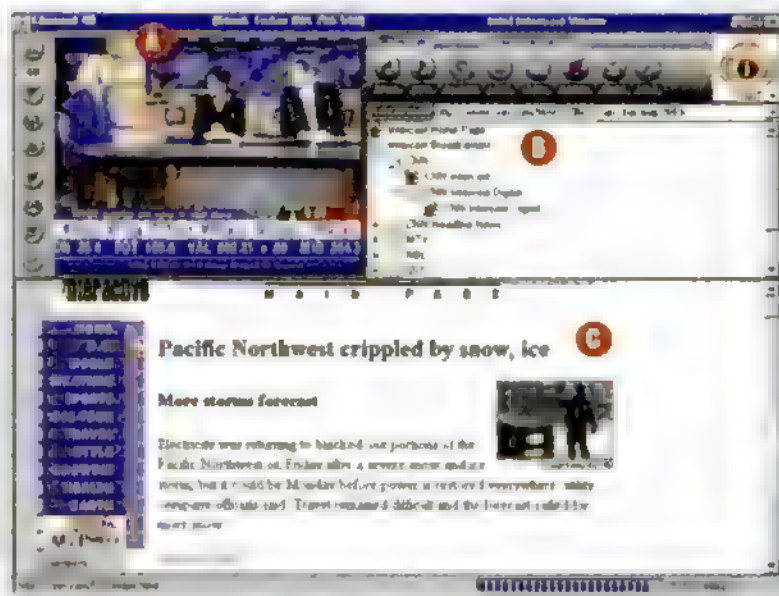
Intericast programming is available on some MTV, NBC,

news summary on the bottom of the screen. When we found an interesting story, we clicked on the highlighted URL and pulled up the specified Web site. STB's on-screen buttons for changing channels, adjusting volume, and capturing still screens made using Intericast fun and easy.

The Velocity 3D, STB TV PCI, and Intericast are the terrific trio of the television world, bringing you video, TV, and information on the small screen.

Velocity 3D. Street price: With 4MB EDO VRAM, \$200. Requires: 4MB RAM, 5MB hard disk space, free PCI 2.0 slot, Microsoft Windows 3.1, Windows 95, or Windows NT.

STB TV PCI. Street price: \$130. Requires: 16MB RAM, 25MB hard disk space, free PCI 2.0 slot, Microsoft Windows 95. STB Systems Inc., Richardson, TX; 888-234-8750; www.stb.com. Circle 401 on reader service card.



ALL IN ONE: By using the Intericast system, you can combine the best aspects of TV with the Web

A. The TV window is controlled by a series of buttons on the left.

B. The information is organized in a familiar file tree; main controls are on the top.

C. Read updated news summaries while you watch events take place.

and password-protected channel blocking. You can also view up to nine channels as thumbnails; click on any thumbnail to expand

and QVC programs as well as CNN and CNN Headline News. We were able to watch the news on CNN while scrolling through a

VIDEO

PC Multiplex Cinema

MovieCD and Motion Pixel technology team up to bring feature films to your PC.—By Brian Nadel

Without an arsenal of specialized hardware or a high-powered PC, playing video files is often a comedy of errors, with jerky motion, poor resolution, and a lack of sound synchronization. But Sirius Publishing's MovieCD has made the most of Motion Pixel technology to bring digitized films a bit closer to the PC.

Selling for \$10 to \$25, MovieCD titles range from *Dumb & Dumber* to *The Poetry Hall of Fame*. We tried out both *The Mask* and *Ticket to New Year's* (a 1987 Grateful Dead concert) on several platforms and found MovieCD to be among the best methods to date

for software video playback.

The viewer, Motion Pixels 3.1, installs in about a minute. MovieCD provides extensive features for customizing how the video is scaled to full-screen, but each entails a trade-off of resolution, frame rate, or moving-image

quality. You get VCR-type buttons (such as stop and rewind), but at full-screen playback you need to stop the film to use them.

On our tests, MovieCD displayed from 10 to 15 frames per second, with only occasional pixelization of details. Sometimes intense light washed out part of a scene, and some straight lines had jagged edges. MovieCD worked best with a 64,000-color display and 256K of external cache, but lesser machines are adequate.

Whether for viewing a comedy on your next flight or for curling up with a good mystery at work, MovieCD is the ticket.

MovieCD. List price: \$10 to \$25. Requires: 8MB RAM, 4MB hard disk space, Microsoft Windows 3.1 or Windows 95. Sirius Publishing, Scottsdale, AZ; 800-247-0307; fax, 214-234-1306; www.moviecd.com. Circle 402 on reader service card.



LIGHTS, CAMERA, PC: MovieCD can turn your computer into a personal movie theater.

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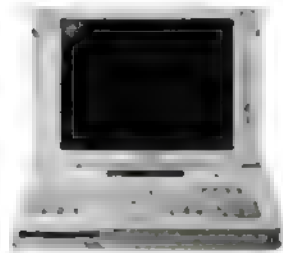
If you'd like even more flexibility, there's the

Armada® 4120. It transforms from a super-portable slimline notebook (with a 120MHz Pentium Processor, of course) to a multimedia notebook with an optional, and detachable, CD-ROM base. And, like the LTE 5300, it can work even harder when you team it up with its optional Convenience Base.

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First Looks

INTERNET

The Internet's Big CD

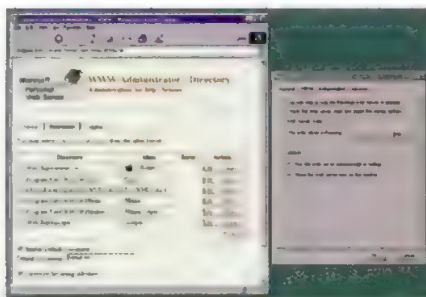
Microsoft Internet Explorer Starter Kit is a small, sleek, useful package for Web users of all skills.—By Scot Finnie

Does the Microsoft Internet Explorer Starter Kit sound like it's for beginners? Despite its name, this \$25 CD-ROM of Web goodies is a one-size-fits-all smorgasbord. Version 3.0 includes such programs as Personal Web Server for Windows 95 and the ActiveX Control Pad that are definitely not for beginners.

The Internet Explorer Starter Kit (IESK) serves up a wide variety of Web support programs; some are must-haves, others are merely useful. The package includes the Internet Connection Wizard and, of course, Internet Explorer 3.0. There are also two dozen Web sites cached on the CD, so people who are new to the Web can get a taste of it before they sign up for access. The

package also offers a 30-day free trial of the Microsoft Network.

Most of the programs on IESK are available for download free from Microsoft's Web site,



HTML FOR THE REST OF US: Most of Personal Web Server's control are found on simple HTML pages. There's also this Properties Dialog box.

but the CD is a major time saver. The disk contains 38 third-party and Microsoft ActiveX controls, Comic Chat, Internet Assistants

and Viewers, Internet Mail and News, the Language Pack, Net-Meeting, the Web Publishing Wizard, a Hellbender trial, and an assortment of TrueType fonts.

Among the newer applications is Personal Web Server (PWS), a low-volume Web server for Windows 95 that installs in a few minutes. It has HTTP and FTP services, simple controls, and excellent security features.

PWS is aimed at work-group intranets, schools, and small offices.

Because it's designed for casual use, PWS demands little overhead and doesn't require dedicated hardware. And for a program that requires only 1MB of disk space, PWS is surprisingly easy to use. Its administration interface is largely HTML-based and can be administered remotely. So it's a good thing PWS supports locally controlled user-level security with Windows NT's challenge/response encrypted-password transmission, which is a

better level of security than that offered by such small Web servers as Quarterdeck's Web-Star and ZBServer.

In a mixed TCP/IP LAN-dial-up Internet access environment, you may have difficulty configuring Windows 95 TCP/IP settings so that you can dial out and access a local PWS server without having to make settings changes. Microsoft says it's working on a fix. But all in all, PWS is the perfect peer Web server solution for low-volume applications.

The Internet Explorer Starter Kit is a stepping stone for those unfamiliar with the Internet and, by packing a ton of useful software into a small package, a time-saver for the rest of us.

Microsoft Internet Explorer Starter Kit, Version 3.0. Street price: \$25. Requires: 8MB RAM (16MB recommended), 18MB hard disk space, Microsoft Windows 3.1, Windows 95, or Windows NT 4.0 or Macintosh System OS. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; www.microsoft.com/. **Circle 403 on reader service card.**

E-MAIL

The Lifetime Mailbox

Bigfoot lets you keep the same mail address even if you change your service provider.—By Barry Simon

Chances are you'll change your e-mail address—just as you do your phone number—several times during your life. Bigfoot for Life can help by providing an intermediate mailbox with a permanent address, so your correspondence will always get through to you.

The free service works like this: You sign up with Bigfoot, fill out a profile, and get a lifetime mail address (bsimon@bigfoot.com, in my case). Bigfoot then forwards all your mail to your online service provider. (You must use one of the most popular providers, such as CompuServe, America Online, or MCI Mail.)

When you switch service providers, all you need to do is change your Bigfoot profile, which is password-protected and can be updated in a few minutes. If you are using POP3 mail (the Internet standard)—but not if you are using CompuServe or America Online—you can even configure your mail program to place your Bigfoot address automatically on outgoing mail.

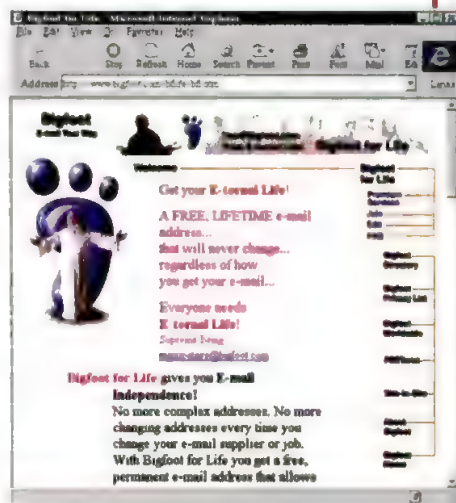
Princeton University has a similar service for alumni that costs \$195, but Bigfoot for Life is free. The company's business plan is eventually to offer its customers premium services for a fee. For example, Bigfoot may offer to filter out spam or junk mail, and it

plans to provide consolidation of mail from multiple mailboxes.

Bigfoot pledges that it will not sell your name or other information to anyone else. Because it has been working with the Direct Marketing Association to develop a "do not e-mail" program, you can have some faith that it is serious about honoring this promise.

Over the course of a month, Bigfoot sent us a wide variety of mail from correspondents throughout the world. The company delivered the e-mail without incident; time lags ranged from a minute or two to as much as half an hour.

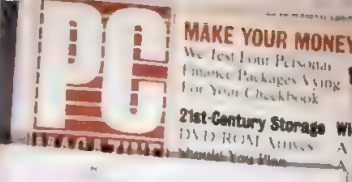
If you're willing to change your e-mail address to Yourname@bigfoot.com, you may never



ETERNAL REWARD? Bigfoot's site dishes up whimsy as well as permanent mailboxes.

have to change it again. **Bigfoot for Life.** List price: Free. Bigfoot, New York; 212-262-1118; fax, 212-262-1079; www.bigfoot.com. **Circle 404 on reader service card.**

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The WinBook FX shown with standard pointing stick, optional touchpad available

We were also impressed with the \$2,999 WinBook FX, and we award it an honorable mention. This lithium-powered notebook's best feature is its battery life: It ran for almost 4 hours on our BatteryMark test. This result is amazing, given that the WinBook runs on a Pentium/133 CPU and features an 11.3-inch active-matrix display. *PC Magazine, January 23, 1997*

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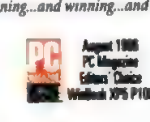
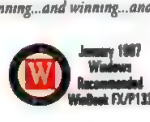
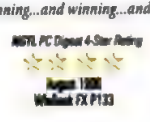
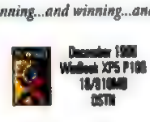
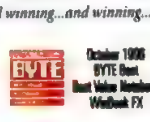
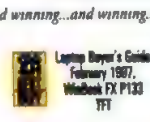
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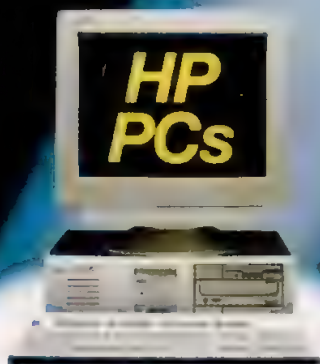


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Model	CRT size/ Viewable	Dot Pitch	Max Resolution	Optimal Res/ Refresh	Plug & Play +
V773	17"/15.8"	.026mm	1280x1024	1024x768/85Hz	Yes
V775	17"/16.0"	.026mm	1600x1280	1280x1024/79Hz	Yes

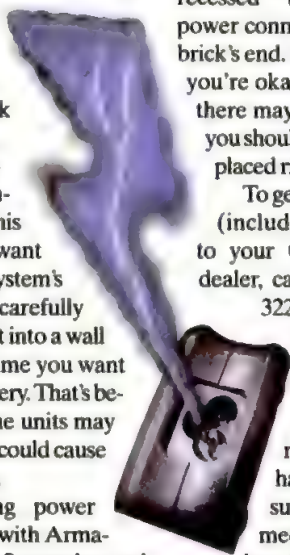
Second Looks

NOTEBOOKS

Power Play

If you purchased a Compaq Armada notebook ("Affordable, Portable, Notebook PCs," January 21, 1997) this past fall, you'll want to examine the system's power adapter carefully before you plug it into a wall outlet the next time you want to charge the battery. That's because some of the units may be defective and could cause electrical shocks.

The offending power bricks were sold with Armada 4100 units last September and October and bear the part num-



ber 217984-001 on the bar code label. The easiest way to tell whether your adapter is potentially dangerous is to look at the recessed three-prong male power connector on the power brick's end. If the pins are solid, you're okay. If they're hollow, there may be a problem, and you should get the adapter replaced right away.

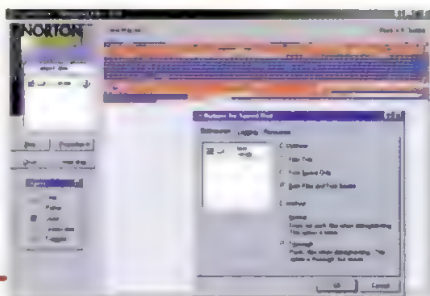
To get a free replacement (including shipping), go to your Compaq computer dealer, call Compaq at 800-322-9515, or check out the details on the company's Web site (www.compaq.com). If your Armada's power supply has hollow pins, make sure you replace it immediately, because the last thing you want from your notebook is a jolt.

UTILITIES

Windows NT Cleanup

Norton Utilities for Windows 95 is the one indispensable package of add-ons for your Microsoft Windows 95 PC (First Looks, February 4, 1997). But what about Windows NT users? They can go to Symantec's Web site (www.symantec.com) and download a developmental version of the firm's Windows NT-based disk defragmentation program, Speed Disk.

The program, which looks and acts much like its Windows 95 counterpart, is all new below the surface, and it can churn through NTFS and FAT disk partitions with ease. It made quick work of cleaning up the nooks and crannies



of a 2GB hard disk on a TI TravelMate 6050 notebook. The beauty of this program is that you can set it to work in the background, so your disk is always ready for new data. You can adjust the priority of defragmentation to suit your needs.

Symantec will soon replace the beta with a trial version of the final program, operative until mid-March. After that, look for the release of a more complete package, Norton Utilities for Windows NT, which will also include Disk Doctor, Unerase, System Information, and System Doctor. Together they should make your Windows NT system as tidy as your Windows 95 PC.

E-MAIL

Eudora: Free for All

As good an e-mail interface as Eudora Pro 3.0 provides (First Looks, November 19, 1996), for many computer users its flexible and powerful message filtering, support for multiple signatures, and configurable toolbar are just too much. Those who want the e-mail basics—and a little extra—should take a look at Qualcomm's Eudora Light 1.54, which is available as a free download from the company's Web site (www.eudora.com).

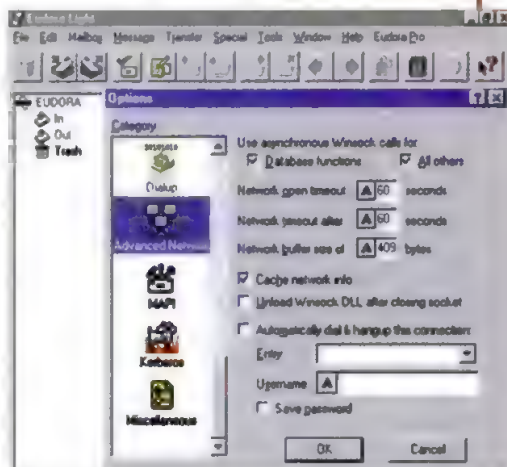
The 2MB program file is well worth the time spent waiting for it to download, because Eudora's refined and elegant interface makes e-mail less of a chore and more like just another way to communicate. The current Light version lacks some of the creature comforts of more industrial-strength e-mail clients—such as a spell-checker—and doesn't support drag-and-drop operations or the use of multiple e-mail accounts. Eudora Light does, however, let you automatically launch your Web browser of choice and jump to a site by clicking on a URL.

In addition, the Light version has a simple-but-effective Find command that can take much of the guesswork out of finding that message you've been looking for. This feature can search through headers and message contents for words or text strings. For world travelers or the linguisti-

cally-inclined, there's even a Japanese-language e-mail client that's waiting for download.

If this sounds intriguing to you, you should also take a peek at the latest from Eudora, Eudora Light 3.0.1 beta, which is available for a 30-day trial. Although this developmental program is not as stable as Version 1.54, it points the way for the future of e-mail clients.

The program adds a plethora of customization options and a powerful plug-in architecture



for such add-ons as compression utilities and translation software. The beta version catches up with Eudora Pro by adding message filtering, drag-and-drop, and support for MAPI mail systems.

Regardless of whether you choose the rock-solid Version 1.54 or the more ambitious Version 3.0.1 beta, you're guaranteed to get your e-mail by special delivery.

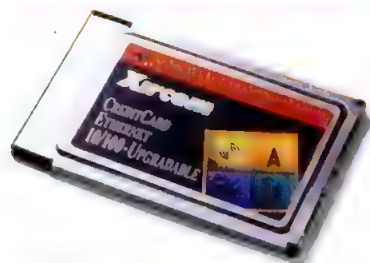
SECOND LOOKS MAILBOX: Tell Second Looks about your experiences with computer products. Contact Brian Nadel via MCI Mail (556-1500), CompuServe (72241,1616), or the Internet (bnadel@zd.com).

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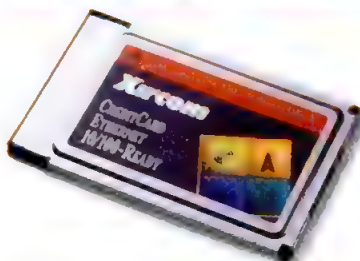
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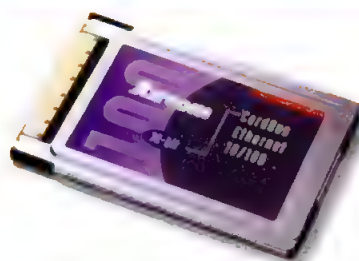
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CreditCard Ethernet 10/100-Ready

This adapter enables today's notebooks to connect to either 10Mbps Ethernet or high-performance 100Mbps Fast Ethernet networks, and automatically detects and conforms to your network speed. Seamless 10Mbps and 100Mbps connectivity means you won't have to upgrade when you move to Fast Ethernet.

\$199



CardBus Ethernet 10/100

This next-generation, 32-bit CardBus adapter connects CardBus-equipped notebooks to both 10Mbps and 100Mbps Ethernet networks with the fastest notebook-to-LAN connection available. Based on the popular PCI architecture found in desktops, CardBus optimizes 32-bit systems, closing the performance gap between notebooks and desktops.



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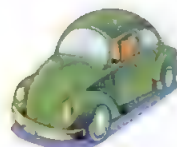
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CIRCLE 266 ON READER SERVICE CARD

"Hey, What's Your Sign?"

We need a new conversational gambit for the 1990s. Each decade has a phrase that summarizes the nation's mood and reflects societal trends. In the 1960s, depending on your point of view, it was either "Wanna get high?" or "Clean up America—get

a haircut!" In the 1970s, a dreamy "What's your sign?" was the national mantra. And in the 1980s, it was obviously "Who's your broker?"

In the 1990s, the catchphrase of the decade could easily be "Who's your ISP?" Comparing and contrasting the services, pricing plans, and points of presence (POPs) of Internet service providers is a task of mind-boggling complexity. It's tougher still if you're intending to host a Web site through your ISP. Add ISDN access and you've doubled the complexity of the process. And after all your deliberations, you still have no idea if the service you've selected is reliable, if it has the backbone speed and router bandwidth to support you and your fellow customers, and if the rest of the world can access your Web pages fast enough.

What choice do you have other than to ask friends and neighbors who are already online?

I was definitely the first kid on my block to have ISDN, and when I got my line, there was little choice among ISPs with ISDN service. I chose InterRamp, which was part of PSI, a backbone and metropolitan-area provider. Neither of the local POPs were very far as the crow flies, but they were toll calls in the eyes of the phone company, and the charges mounted quickly.

Still, the high cost of maintaining a link was subordinate to the access itself. During normal business hours, it could take many retries before I got connected. Once I had a connection, I usually kept it, but getting knocked off-line was not unheard of. Then PSI sold its InterRamp group to MindSpring (www.mindspring.com), an ISP located in Georgia. Service improved dramatically. Whether fewer people were competing for the same lines or whether MindSpring upgraded the POPs, I have no idea. But I always get a connection, and subjective performance is better. This, along with an attractive pricing plan that includes unlimited 128-Kbps access, additional e-mail accounts, and 10MB of Web page storage, constitutes the good news.

The bad news is that I'm using the service more, and my phone bill has skyrocketed. Unless MindSpring builds a

new POP between the two POPs I dial into or I come up with an extended-range calling plan, I'll probably switch to a new, lower-cost ISP.

In fact, I've already started looking. AT&T WorldNet has a POP right in my exchange. Too bad it doesn't have

ISDN. I got a copy of *Boardwatch* magazine's quarterly directory of ISPs (also available online, at www.boardwatch.com). The directory has some valuable information, such as the number of ports and the overall bandwidth of each ISP, but it doesn't address the question I want answered—namely, "What ISPs provide ISDN access in my local area and have more than a shared T1 line for all users?" The directory also lists ISPs by their home locations, not by POPs, so I have little choice but to go to each ISP's home page and slog through its site, looking for the POPs list. Trouble is, many ISPs use different numbers for their ISDN connections, and the ISDN numbers are often not listed at the sites.

The seemingly infinite resources of the Web don't help much in the quest for an ISP. Sites such as The List (thelist.iworld.com) are just that—lists. The List lacks such vital information as the number of subscribers and backbone speed, and you must browse a hierarchical text file rather than a database. You can't select, search, or sort on the things that interest you.

Another promising resource, TAG Online (www.tagsys.com/providers), gives

you two ways—standard HTML hierarchies and a search engine—to peruse its list of Internet service providers. But the list is incomplete, and it has the same shortcomings as the previous two lists. The search feature makes it easier to get started, however, and at least gives you something to go on.

All told, I spent an entire day perusing ISP offerings, and I'm still at the beginning. I'm also amazed at how impenetrable some ISP sites are. It's as if they didn't want new customers, based on the lack of information on local exchanges, number of lines, bandwidth, rates, and storage options.

Oh, and hey—if you know of a good ISP with ISDN and a local POP in the 908 area code, 322 exchange, send me some mail at bill_machrone@zd.com. □



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Where's My Robot?

Take a look at the history of personal computing. There's an obvious pattern. Every time a new hardware device comes along, it spawns a killer application that taps its potential. But in the attempt to build bigger and faster computers, we've somehow skipped

over one obvious killer application. I'm talking about one just about everyone would love to have: a personal robot that can do chores, such as clean the house. When you think about how computing power has multiplied in recent years, it's amazing no one has invented such a device.

The first desktop computers had no power and little storage. Having a 70K floppy disk was a big deal. Low capacity limited the machines to crude word processing. The introduction of the hard disk gave rise to the database manager. Modems ushered in telecommunications and, eventually, the World Wide Web. CD-ROMs made possible elaborate games and portable mass storage. Laser printers added desktop publishing. You get the picture. (Curiously, faster processors tend to make for bloated code and not necessarily killer applications, although it could be argued that such chips enable high-end graphics and multimedia applications.) Graphics in general require faster processors. So does pattern recognition. A perfect fit for the robot.

A number of new technologies milling around could soon turn into killer apps. Desktop teleconferencing has been trying to make a move. PC photography is a favorite of mine. Now you can use a GPS device on your laptop. But if we look back on the great killer apps of the past—from the first spreadsheet to the first popular DBMS and desktop publishing software—we see that none of them filled needs that were immediately apparent at the time. They were all innovations whose potential was obvious only after their emergence. That's why picking the next killer application is always difficult. Who could have predicted the explosive growth of the most recent killer app, the World Wide Web?

The weirdest aspect of killer apps is that most of them first appeared on the Apple II or on the Macintosh. The only killer apps to begin life on non-Apple platforms were Electric Pencil and dBASE, back in the 1970s. Since then, spreadsheets (VisiCalc), Web browsers (Mosaic), graphics and illustration programs (MacPaint and Photoshop), and desktop publishing (Pagemaker) were all born on Apple

computers. Now the Mac appears to be moribund. But it should be noted that Apple has already been associated with a personal robot, the Androbot of the early 1980s.

While Microsoft hates to be called a copycat, it seems to lack real vision. Microsoft's simplified user interface, Bob, was probably the Redmondians' last best hope. If Microsoft had only realized that what it was really trying to do with Bob was to create a robot, and if it had used its huge reservoir of R&D money to develop the real thing, then Bob might have had a longer shelf life than milk. Microsoft would still be a copycat, but no one would care.

I recall when robotics was hot, back in 1983 or so. Androbot was being exhibited at CES. It would get a beer for you. A few industry insiders believed that we were coming upon the year of the robot. I've always argued that the most overlooked aspect of computing has always been the robotic function. In word processing, for example, when you tell a program to print a document, it is acting as a robot—"typing," if you will, the document as many times as necessary. Making changes and typing again. A recalc on a spreadsheet is similar task. The slew of programs available now that venture out onto the World Wide Web at 3 A.M. to download pages for you to read in the morning are doing robotlike work, gathering stuff for you.

Computers have revolutionized the workplace, allowing fewer people to do more work and spurring the downsizing revolution. We all know how assembly lines were downsized as computer-assisted robots for welding and assembling parts went online. So as we enter the next generation of computers and the new millennium, I have to ask: Where is my personal robot? The idea is 20 years old, and the one that fetches a beer isn't even around anymore. Why should I have to vacuum the floor or pick up toys in the 21st century? Soon I'll have a multibillion-instructions-per-second processor on my desktop. And for what? To run Word? To load a Web page? To play Duke Nukem 8D? *Where is my robot?* Even a slow-moving little dust-picker can accomplish a lot working 24 hours a day, seven days a week.



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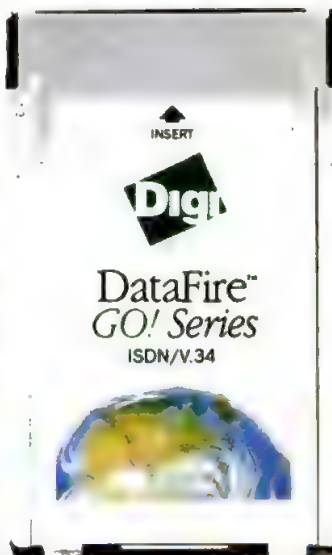
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Inside Track

Daughterboards **Forever Dept.:** In case you haven't noticed, Intel is again trying to change the way people build computers. A few years ago it introduced all these extra sockets so you could drop in upgrade chips and **extend the life of your machine.** That almost worked, except for three things: The upgrades were not released in a timely manner, you had to upgrade memory—and hard disks, too—as software requirements changed, and you could buy a new machine for almost the same price as all these upgrades.

Now Intel is rolling out new packaging—essentially a **daughterboard** rather than a standalone CPU—for its next generation of machines. On the board will be the processor(s), a connector for the L2 cache, and some support chips. It should be noted that this new design is what **AMD is making a lot of noise about**, since the relocation of the L2 cache has required that the cache be doubled in size to maintain system performance.

In any event, Intel is sticking with the design and intends to use it on the **Pentium MMX, too.** The company wants to make a module for high-end notebooks, so the Pentium MMX module can be swapped out of a system and the Pentium Pro module **can be swapped in** without a complete system redesign.

Is the DVD Standard Becoming Unraveled? Dept.: Last summer, the much-hyped DVD systems were supposed to hit the market with players that at the minimum could show movies. By the end of the year, computer systems with DVD-ROM drives were supposed to appear. By the end of this year, the write-once and then the write-many DVD-RAM devices were scheduled to arrive. **So far, bupkis.**

Worse is that **new standards and contradictory technologies** are emerging from the supposedly rock-solid DVD coalition. This includes a **new magneto-optical** technology dubbed MO7, which looks to compete directly with DVD, which uses phase-change technology—long considered to be the technology for all future read/write optical drives. The MO7 technology uses the same size disk (12 cm) but can achieve **6GB to 7GB of read/write** storage, as opposed to DVD-RAM's 2.6GB of read/write storage. (A DVD holds 4.7GB in its "pressed" read-only form on one layer/one side.) The MO7 technology not only confused the DVD issue but established a new format for the current read/write market of 3.5-inch (230MB) optical and 5.25-inch (1GB to 2GB) drives.

The DVD-RAM designers believe DVD-RAM, which will be readable by regular DVD drives, will be the market winner. This assumes DVD drives will find their way into

*Intel is again trying
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the market sometime soon. Then again, Fujitsu engineers say it may somehow be possible to make **DVDs readable by an MO7 drive**, too. That isn't well explained, but if an MO7 drive can be designed to read MO7, DVD, and CD-ROM formats, it may get a leg up on DVD for the computer user market.

Meanwhile NEC is becoming a fly in the ointment with its new optical technology for use in cameras, among other things. It holds up to **5.2GB per side, read/write.** In response, the DVD consortium says it may be able to give DVD-RAM a 5.2GB capacity to match the NEC device. I assume they will roll out the 2.6GB design and then introduce a "double-density" version at a higher price. Gee, where have we seen this before?

Microsoft, meanwhile, has put its camel head into the tent regarding DVD. Microsoft wants to ride the DVD wave in a big way, and we can expect every driver needed to run DVD to show up on PCs sooner rather than later. According to some reports, Microsoft is **a threat to the DVD-player business**, because it wants to add special optimization that would make the PC the player of choice for DVD media, potentially **killing sales** of the underpowered standalone DVD players on which the Japanese are banking.

I believe Microsoft will **finance a plan** whereby developers will add special computer-only features to their offerings. For example, a game would deliver one experience on a standalone player, but when you drop it into a PC, new bells and whistles would emerge. Over the last decade, Microsoft has felt betrayed by consumer electronics companies, **specifically Philips**, which developed the CD-i device without consulting Microsoft. In fact, Bill Gates himself was surprised when Philips, years ago, announced this thing right in the middle of an early CD-ROM conference sponsored by Microsoft. It was humiliating. CD-i remained vaporware for years—and was **a huge dud** when it came into the market. That fiasco muddled the entire CD-ROM market, which was heavily promoted by Microsoft. To prevent a repeat, Microsoft would love to co-opt the entire DVD market.

Another Hurdle Dept.: Microsoft and the rest of the industry will have to deal with the DVD encryption scheme that is being **foisted upon the industry by Hollywood**, which believes everyone wants to copy and sell its precious films. After watching the consumer electronics companies botch the process, IBM and Intel joined forces to come up with an encryption standard. They hope it is secure enough to prevent government regulation regarding the use of DVD technology. Hollywood wants to **make it a federal crime** to tape, for example, from a DVD. Worse, you'll need a decryption license just to use DVDs. This is shaping up to be another fiasco. □

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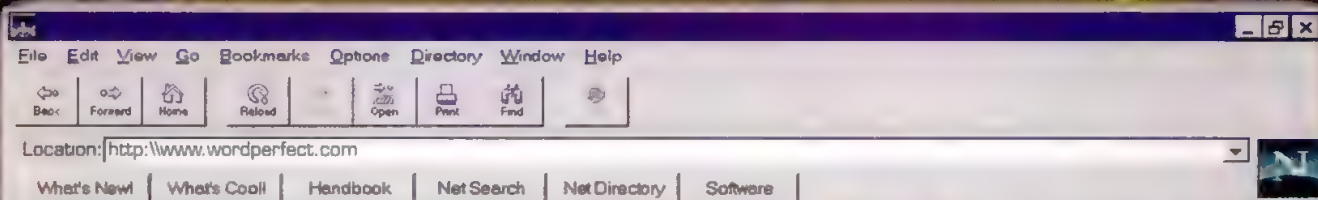
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Midpriced Notebooks Take Over

All taxonomies crumble with time, and market models die even earlier deaths. As recently as January, when I praised the Hewlett-Packard OmniBook 800CT as a 1996 product of the year, I wrote here about my oft-stated and widely quoted model for the

notebook PC market. There are only three viable positions in notebooks, I've often said: high-end, high-cost, and fully featured; low-end, low-cost, and reasonably featured; and as small and light as possible. Notebooks that don't hew closely to one of those three ideals have little hope, I've said—and that's generally been true.

But I've also said that over time this model would itself collapse toward the center, with less expensive notebooks climbing the feature ladder, high-end boxes coming down in price, and both of them tending toward smaller and lighter designs.

Well, you won't be hearing much more from me anymore about that old three-position taxonomy. The rush to the center has begun in earnest, and the model is collapsing. We'll still see some of those \$7,500 wonders (but darned few), and some of those low-priced machines (certainly fewer than in the past), as well as interesting new ways of packing notebooks ever more densely to make them thinner, lighter, and maybe a little smaller in area (though there is a point of diminishing returns here). But this rush toward the center of the economics/features scale is going to be so dramatic that new notebooks positioned near the outer ends of the scale will have short, unhappy market lives.

The machine that first set me thinking about how my once-golden three-points model is fast becoming obsolete was the Dell Latitude LM P133ST. An absolutely mainstream, full-featured power notebook in every way, it sells for \$2,999 with an 800MB hard disk and 16MB of RAM, or \$3,499 with a 1.4GB disk and 40MB of RAM. Both configurations use 133-MHz Pentium chips. You can get slower CPUs and passive-matrix-display variations, but save your money—those are bad buying decisions. The 133-MHz prices are values by almost any standard, but any idea that this machine is a stripped-down "price-point box" fades fast once you begin using it.

For one thing, the Dell Latitude is simply the fastest notebook I've ever used. For another, it has the best display—a 12.1-inch, 800-by-600 active-matrix screen—and the best notebook keyboard. The Latitude comes with

both a 3.5-inch drive and a 6X CD-ROM. And the smart lithium battery not only gives long life (I've been getting 4 hours with power management turned on but without heroic efforts to stretch the time), it also has a very useful built-in LED gauge to report its present charge. So when I

grab my extra Latitude battery out of the bottom of my computer bag, I know at once whether I remembered to charge it.

That's a lot of computing firepower for \$3,000. I wish it were thinner (it's about 2 inches thick) and lighter (it's about 7 pounds); I wish the display weren't limited to 256 colors at 800-by-600; and, once in a great while, I wish I could kick it up to the 1,024-by-768-pixel resolution just beginning to appear on much higher-priced machines. But I can live with that size and weight and those few display limitations, because the Latitude gives me so much in return.

The second and third machines I've used lately that persuaded me of the death of the three-point model are the Acer AcerNote Nuovo and the AcerNote Light Multimedia. The former is a relatively heavy (7.5-pound) full-size notebook; the latter, a more svelte (5.5-pound) machine. Both deliver top-drawer functionality and performance at what have long been seen as middle-market street prices: about \$3,500 for the 133-MHz Nuovo (skip the pricier-but-not-worth-it 150-MHz version) and \$2,999 for its smaller (also 133-MHz) sibling, both in the kind of configurations you really want.

The AcerNote Nuovo distinguished itself by offering the longest one-battery running time I've ever seen; I get between 6 and 7 hours with power management turned on but without tremendous attempt to stretch battery life. That may fall short of Acer's inevitably optimistic 10-hour claims, but it almost doubles the battery life of nearly every other high-performance notebook I've used. The lighter AcerNote Light Multimedia goes only about 3 hours on batteries but otherwise delivers ample computing power and rich features at the same magic under-\$3,000 price Dell exploits.

Machines like these three (there are more out there, and



CENTER COURT
New notebooks positioned at the outer ends of the scale will have short, unhappy marketing lives.

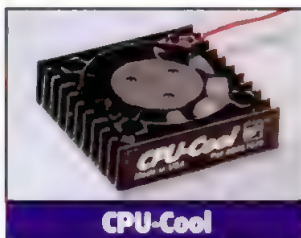
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JIM SEYMOUR

lots more coming this spring, including some killer new notebooks from Gateway 2000 and Hitachi) may not spell doom for the highest-end IBM 765s and Toshiba Tecras, but they sure cut back on the sales forecasts for those machines. They also limit the market opportunity of new machines from the likes of Texas Instruments, whose Extensa 900 notebooks are real head-turners.

Corporate PC managers have told me time and time again that even though they consider the notebooks they buy today to be disposable systems (get two years out of them, both technologically and in terms of wear and tear, and you should consider yourself lucky) paying \$3,000 to \$3,500 for a notebook today is about right. Acer, Dell, and a growing list of other notebook vendors clearly understand that.

Hidden here is another big step forward for these moderately priced, high-power machines: They really do make good replacements for desktop PCs, and at manageable prices. Dell will sell you a desktop machine with specs very close to those of the \$2,999 Latitude LM P133ST for about a thousand dollars less. That \$1,000 difference is a pretty constant premium across vendors for comparable notebooks and desktops these days and, given the additional value delivered by a notebook over a desktop, is an entirely reasonable delta over desktop PC prices.

Study after study shows that payback is much faster for workers using notebooks—in other words, the real cost of a notebook is probably less than that of a desktop alternative—and user satisfaction is much higher. The “closed box” nature of notebooks, which are generally expandable only by plugging in PCMCIA cards or connecting to the machines’ external jacks, may limit some power-hungry users, but it makes for a much more stable, consistent, and maintainable fleet of PCs for companies’ IT shops.

It's always fun to propound the rules and principles and taxonomies and models that others adopt, and I've had a lot of fun hearing people quote the three-viable-positions model for notebook PCs. But like notebooks themselves, and indeed all PCs, market models have an incredibly short market life these days.

It's time to lay this one to rest and to start focusing on that fat center of the market between \$3,000 and \$3,500, where the price and functionality curves intersect. Vendors that still think in terms of the old model will have warehouses full of nearly unsellable machines by summer. □



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Software Snafus

Remember how, as a little kid, you thought the actors on TV lived inside your set? Don't you wish software designers actually lived inside your monitor, so you could occasionally reach inside, grab them by their scruffy necks, and provide instant feedback on the ill-

behaved programs they force you to use? Last issue, I wrote about how fast PCs and graphical software have made us more productive. In this issue, I want to explore the flip side: the nagging problems that still drive us crazy.

On the hardware side, the biggest hassles for me are the limit of 16 interrupts and the effective limit of one printer port plus two COM/modem ports. We've actually seen home PCs arrive for testing with all interrupts already taken. If you want to run two printers and a personal scanner, or a modem and an ISDN modem, you're hosed. Universal Serial Bus and IEEE 1394 (FireWire) can't happen fast enough. In the short term, specifying SCSI devices can help get you through.

But the software side is where I really get annoyed. In particular, when Microsoft Windows has more than 100 million users, you'd think the OS would allow for a bit more individuality. Too much of Windows 95 panders to the lowest common denominator. Even as the number of rank novices using Windows declines, too much of the operating system still assumes you're a dunderhead.

Take, for instance, a printer dialog box. You may have to drill down three or four layers to set all the parameters you want, because the top level lets you choose only the number of copies and maybe portrait or landscape printing. Wouldn't it be nice if you could choose to have *every* option at the top level of a dialog box? Or to be able to drag and drop to the top level all the choices you always use? And at the same time, wouldn't it be nice if you could remove choices you never use? If you live and work in the U.S., when was the last time you printed on A4 (210- by 297-mm) paper? Why should we have to scroll through choices we never use?

It's not that dialog boxes don't have the room for more choices. There's a lot of space—mostly wasted background space. The Find Files dialog box (on the Start menu) takes up almost a third of your screen real estate in 800-by-600 mode, yet your search displays only three files at a time, unless you maximize the screen. And the associated Quick View file preview is painfully slow.

Microsoft will probably note that these dialog boxes were designed by the best and the brightest, people who've devoted their lives to understanding information display, whereas people like me are merely *users* who don't understand the big picture. Maybe so, but I wasn't the one who unleashed Bob on an unsuspecting world.

Then there's the opposite situation, where the software could provide more detail without getting in the way of users, regardless of skill level. Enter Setup in your PC's BIOS, choose Parallel Port, and you'll see several choices: AT-compatible, ECP, or EPP. Confused? Pressing F1 for help may only tell you what the abbreviations stand for, not which choice makes sense in which setting.

And there's functionality you'd expect and don't find. Example: The generally excellent Microsoft Publisher 97 lets you *create* business cards, but there's no preset template allowing you to *print* business cards on perforated Avery label stock. Instead, you're expected to print out a master sheet with crop marks and take it to a local print shop.

Don't get me started on online computing and the Internet. That's a column in itself. Three obvious problems: First, modems are too slow by a factor of 10. (Thank goodness for the T1 Internet connection at the office!) Second, often you're lucky if you can get on at all. I never noticed AOL's 19-hour service outage last fall, because it wasn't a whole lot different from the kind of mediocre

service I'd been getting all along. Finally, what's on the Internet is data. What I want is information. There's a difference. Information is data that's useful and that you can find. Today's search engines, such as Alta Vista, Excite, and Yahoo!, are pretty impressive when you think of how much information they digest and index. But they're still Model Ts compared to what we need.

So what's the bottom line? Are PCs really making us more productive? Or are little gotchas driving us crazy? The important thing is that PCs have made us all more powerful. And thank goodness software designers don't live inside monitors—or many of us would be facing assault charges. □



GUI GONE WRONG

Windows dialogs were designed by experts. Then again, Microsoft unleashed Bob on the world.

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NETWORK EDITION

IP ADDRESS MANAGEMENT

Solve the Address Mess

IP management software automates the assigning and tracking of IP addresses on a large network.



By Steve Rigney

Until recently, most administrators used pen and paper or a spreadsheet to keep track of all the IP addresses on their networks. As networks grew, changed, connected to the Internet, and became intranets, managing IP addresses became a task that required a lot of time and effort—sometimes even a full-time employee. Fortunately, some software developers were able to foresee this problem and develop a set of specialized IP management applications for large-scale corporate networks. In this roundup we look at three of the most popular and powerful IP management tools: Cisco Systems' Cisco DNS/DHCP Manager (CDDM),

ILLUSTRATION BY MARK AND ROSEMARY JARMON

INSIDE



If you're in one of the thousands of organizations setting up an intranet and connecting to the Internet, you've wrestled with the headaches of installing TCP/IP on the network. NOSs such as Windows NT and IntranetWare provide some of the IP tools you need but not all.

IP ADDRESS MANAGEMENT software is the topic of this Network Edition cover story. Dealing with IP addresses on a large WAN with constant adds, moves, and changes can be a full-time job.

MANAGEMENT PACKAGES FROM Cisco Systems, Isotro Network Management, and QuadriTek Systems help out because their DHCP and DNS servers can communicate either with a central database or with one another to make sure duplicate addresses and other management headaches don't happen anywhere on your WAN. Contributing editor Steve Rigney installed and tested each of these packages to see if they can truly rescue you from IP address hell.

MULTIPOINT DOCUMENT conferencing may be even more useful than videoconferencing for getting your point across. In First Looks, contributing editor Tony Pompili reviews PictureTalk Communicator, which lets you set up multipoint document conferences over the Internet. Contributing editor Les Freed tests an ISDN router from Digi International that has two serial ports for modem connections; and support technician Kevin Young tackles a package from Baranof Software for monitoring your IP-based server applications. (Page NE13.)

FINALLY, NETWORKING NEWS and how to read it is senior networking editor Frank Derfler's subject in Multiple Access. (Page NE18.)

—Leon Erlanger

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Isotro's NetID, and Quadritek's QIP.

These products provide you with the servers you need to assign and track IP addresses, and the tools to set up and manage the servers. Before discussing the benefits and drawbacks of each solution, we need to look at how these TCP/IP services work and why you need an IP manager to set them up and keep them running.

THE DHCP SERVER

If you manage a small LAN with only a hundred devices or so, you can probably keep track of all your IP addresses with a simple spreadsheet or database. When you add or move a device, you simply pull up the spreadsheet and see what addresses are available. Unfortunately, it can become difficult to keep track of adds and moves among thousands of remote and local users distributed in various subnets stretched across an enterprise WAN. Duplicate IP addresses can result, causing devices with the same IP address to lock up. This problem becomes heightened in networks connected to the Internet, as each IP address has to be unique among the millions of devices registered on the Internet.

The other big problem is the number of addresses available for all of your devices. IP addresses are divided into three classes: A, B, and C. Each address consists of four *octets*, or sets of eight binary digits, separated by decimals. The first octet determines which class the IP address is in. For example, the first octet in a class A address is 1 to 127; class B includes 128 to 191, and class C is 192 to 223. Class A addresses use the last three octets to identify specific IP nodes, while class B addresses use the last two octets for this purpose, and class C addresses use the last octet. While there are only 126 class A addresses in the world, each of them can be used to create almost 17 million unique host addresses. There are more class B addresses available, but each can be used to create only 65,534 host addresses. And while class Cs are the most abundant, you can only use them to create 254 addressable nodes.

Obviously, it's almost impossible to get a class A address, and even class Bs are becoming scarce. Therefore, most networks connected to the Internet have to use multiple class C addresses or deal with the problem of too many devices and not enough addresses.

A process called the *Dynamic Host Configuration Protocol* (DHCP) is designed to solve these two problems. In the most basic terms, DHCP is a client/server application that automatically assigns or

Editors' Choice

• QIP 3.0 (Unix)



All three products ease the process of configuring and

maintaining DNS and DHCP servers on a large network. But QIP stands out for its combination of features and ease of use.

QIP was the only product whose DNS and DHCP servers could run on both Microsoft Windows NT and various flavors of Unix. The Editors'

leases an IP address to a device when it connects to the network. The device, such as a network PC, runs a piece of software called the DHCP client that issues a request when you start up. The server receives the request and issues the client an IP address. You can configure the DHCP server to assign the device a permanent address, generally called a *static address*, or a temporary address for a specified time, usually called a *leased address*. In leasing an address, it's not necessary to have enough addresses for all of your clients, because chances are they will not all be turned on at the same time.

THE DNS SERVER

If you have a photographic memory, you may be able to remember all of the 12 numbers that make up a typical IP address, but most of us can't. This is where *Domain Name System* (DNS) servers can help you. A DNS server is a database that keeps track of your network devices' IP addresses and associated names. For example, you can use a DNS server to associate the address 204.49.54.7 with the name *srigney.pcmagazine.com*. While DNS servers make it easier for your users to find network hosts and other nodes, they are generally difficult to set up and maintain, requiring that you edit complicated configuration or zone files when you make a change.

MERGING THE SERVERS

All three products in this roundup come with DHCP and DNS servers, but it's how the products integrate the two types of servers that sets them apart. By them-

Choice goes to the Unix version, since we found a few bugs in the Windows NT version. QIP claimed to have fixed those bugs as we went to press.

While the features of NetID and QIP are similar—dynamic DHCP addressing, automatic updating of DNS servers with DHCP-assigned IP addresses, easy configuration of subnets, excellent reporting—QIP's installation was significantly easier than NetID's. And QIP's Web interface lets you view multiple reports from a browser. Cisco DNS/DHCP Manager is a decent solution for medium-size networks but is not as feature-rich as the other two products, and the version we tested had problems with Windows 95 and NT DHCP clients.

selves, DHCP and DNS can't communicate. DHCP assigns the addresses, and DNS assigns the names. If you make a change to the information on one server, you'll have to edit the other manually. For example, keeping your DNS server up to date necessitates editing the database manually each time the DHCP server allocates or changes an IP address. If you use the servers with the products here, all of your DHCP information is added automatically to your DNS servers and made available to other DHCP servers on the network. Depending on the package, this functionality is provided by standard zone transfers or a common database.

Isotro's NetID and Quadritek's QIP use either a Sybase or Oracle database to keep track of all the available IP addresses and other information, such as host (device) names and subnet masks. Both NetID and QIP update the database and any DHCP and DNS servers with real-time information, but they do it slightly differently. For example, when a change occurs, NetID's DHCP server sends information to the database and the database automatically updates the DNS server information. QIP's DHCP server sends out a dual message when a change occurs. One message is sent to the DNS server and the other to the database. Unlike with NetID, if the QIP database is down, the DNS server will still be updated by the DHCP server.

CDDM doesn't use a common database but relies on a utility that sends name and address changes from the DHCP server to the DNS server—a process called *zone transfers*.

QIP and NetID provide another useful

Oracle vs Informix

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GLOSSARY

Important IP Management Terms

BIND (Berkeley Internet Name Domain) A popular public-domain DNS server package created for the BSD (Berkeley Software Distribution) version of Unix but currently available for almost every Unix flavor.

BootP (Boot Protocol) A protocol used for assigning IP addresses to workstations on boot-up based on the address of each station's adapter card. BootP provides data such as the subnet mask, gateway address, and DNS server addresses.

CIDR (Classless Inter-Domain Routing) A method for combining several class C networks into a larger address pool.

DDNS (Dynamic DNS) An open standard for dynamically assigning a user-friendly name to a

DHCP-supplied IP address. (See *WINS*.)

DHCP (Dynamic Host Configuration Protocol) A client/server protocol for assigning static and temporary IP addresses, and in some cases names, to network devices. DHCP can reassign IP addresses to devices on the fly.

DHCP lease The length of time a DHCP client can use an IP address. DHCP leases are assigned by the DHCP server software.

DNS (Domain Name System) A distributed database that maps network devices' IP addresses to user-friendly names.

Host ID The part of an IP address used to identify a device on the network.

IP address A 32-bit number consisting of four

octets (sets of eight binary digits) that specifies a network address and a host ID on a TCP/IP network.

Subnet A portion of a larger network that shares part of that network's IP address.

Subnet mask A 32-bit number that uses the same four-octet format as an IP address. Subnet masks provide a method of splitting a single class A, B, or C address into smaller subnets.

TFTP (Trivial File Transfer Protocol) A scaled-down version of FTP that allows you to transfer files between two host computers. Unlike FTP, TFTP does not provide any authentication.

WINS (Windows Internet Naming Service) Microsoft's proprietary method for mapping IP addresses to NetBIOS device names.

feature called *dynamic DHCP addressing*, which allows the DHCP client software running on the PC to use its NetBIOS or machine name as a host name. For example, the DHCP client will send the name of the PC with a request for an IP address to the DHCP server, and the server will provide that PC with an IP address and host name and then update the DNS server with all of the information. This allows you to assign each of your devices on the network with a user-friendly host name that everyone can remember. This means, however, that you need to give your PCs and other devices descriptive and unique names. CDDM currently doesn't provide dynamic DHCP addressing, but like the other two products, it does work with automatic addressing, which automatically assigns a host name you designate to a device when it requests an IP address.

Finally, all the products let you keep your previous DNS and DHCP servers in some locations if you wish. You can import the information to the database periodically and export it to update your servers, but you won't get automatic updates.

THE TOOLS

In our testing, we found that the biggest benefit of these products, besides the server integration, was the graphical front end that helps you install and manage the servers. The tools include utilities with an easy-to-use interface for setting up your servers and configuring other settings such as your address ranges, subnets, and lease pools and then automatically editing the complicated zone files the servers need.

To make the tasks even easier, NetID and QIP include templates that you can use to set up a type of device (such as a

workstation or router) once and then use the templates for all subsequent additions. Although using the administrative utilities that allow you to perform these tasks is better than editing zone files, they still aren't simple or intuitive. CDDM runs only on Unix, but NetID and QIP provide Windows-based administration utilities. Of all three, NetID provides the best interface for moving around and making changes.

Both NetID and QIP allow you to create detailed reports showing all of your addresses and how they are being used. CDDM doesn't offer any more reporting capabilities than the average DHCP server, so you will have to navigate the utility manually to gather information.

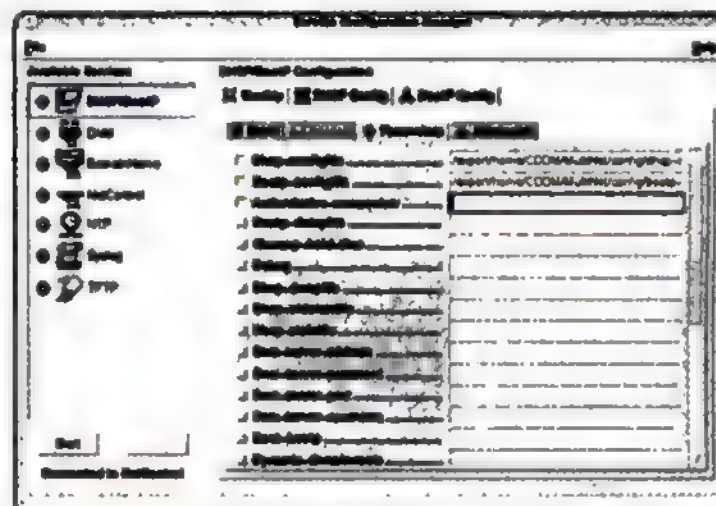
Overall, these products are expensive and complicated to install and learn. If you have fewer than a hundred IP devices, they are probably not necessary. But if you manage a large and changing network, you'll wonder how you lived without them.

Cisco Systems Inc.

Cisco DNS/DHCP Manager

Although it doesn't come with a scalable database, support dynamic DHCP addressing, or provide the number of reports that NetID and QIP provide, Cisco Systems' Cisco DNS/DHCP Manager (CDDM) was the easiest of the three products tested to install and use, and it could be a solution for medium-size networks. Unfortunately, we found a serious flaw in the present version:

CDDM's DHCP server is not 100 percent compatible with the DHCP client that comes with Microsoft Windows 95 and Windows NT. The Windows DHCP clients accepted the IP address but not the host name from Cisco's DHCP server. If you want CDDM to assign your network clients a DNS name automatically, you



CDDM's DHCP configuration utility lets you set up all of your parameters without having to type cryptic commands at the Unix console.

will have to use a DHCP client from another vendor, such as Frontier Technologies or FTP Software. Cisco claims to be working on a solution to this problem.

CDDM runs only under several flavors of Unix, but Cisco informed us that it will offer a new version of CDDM for Windows NT in the second quarter of 1997.

The CDDM package includes the Cisco Server Suite 1000 and the Domain Name Manager (DNM). The Server Suite consists of DNS, DHCP/BootP, Network Time Protocol (for syncing time between servers), and Trivial FTP servers, plus a graphical management utility. The Domain Name Manager is a graphical browser allowing you to manage the DNS information on your network: adding address



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get a grip

TCP/IP Under Your NOS

By Steve Rigney

What if you don't have a large enterprise WAN that merits the purchase of a high-end IP management suite, but you still want some of the same features? Well, the solution may be right under your nose—or NOS (network operating system). The most popular NOSs, including Novell's IntranetWare and Microsoft Windows NT Workstation 4.0, provide powerful TCP/IP services for handling the needs of many small or medium-size networks. Each of these operating systems includes a DNS and DHCP server, a Web server, and a multiprotocol router. Unlike the products in the main roundup, the TCP/IP servers in IntranetWare and Windows NT don't provide dynamic DNS updating, communicate with a central database, or offer a lot of management tools, but you may not need those features.

Windows NT's DHCP server 4.0 includes a DHCP Manager that makes it easy to set up address pools to lease or assign addresses to your clients when they log on. Unlike the DHCP servers we tested, Windows NT's DHCP server doesn't work with the BootP protocol 100 percent, so you can't use a device's MAC address to assign an IP address.

The DNS server in Windows NT is also easy to install, and it adheres to all of the IETF (Internet Engineering Task Force) standards. Although the product does not provide automatic updates of DNS servers with DHCP information,

it comes closer than Novell's DNS server by offering Windows Internet Naming Service (WINS). WINS uses a client/server technique to keep a database of PC NetBIOS names and their associated IP addresses. Like DHCP client dynamic updates, it allows you to add the name of the PC to its IP address in the WINS database. Unfortunately, WINS works only with Windows 3.x, Windows 95, and Windows NT clients and does not interact with the DNS server.

NOVELL'S IP SERVICES

Like all IntranetWare services, Novell's DHCP server runs as an NLM. But this means that the configuration interface is limited to character-based menus and is not very intuitive. The DHCP manager is difficult to maneuver and is limited in some of its features, such as the ability to exclude IP address ranges from being assigned dynamically to certain DHCP clients. Unlike Windows NT's DHCP server, however, Novell's DHCP server does work with BootP clients.

The IntranetWare DNS server is not much easier to configure than the DHCP server, but it works with any client device capable of performing DNS lookups. You configure the DNS server by using the NLM-based utility, Unicon. Unicon controls many server functions and provides several debugging and error notification options. You can update IntranetWare DNS servers by importing zone files from other DNS servers.

pools, creating subnets, and making address changes. All the software pieces work together. For example, when the DHCP servers lease an IP address to a network device, they automatically update the DNS servers with information that includes the device's IP address.

CDDM retails at \$6,000 for 5,000 nodes (or \$20,000 for an unlimited-node license), making it one of the least expensive products in this roundup. Our favorite feature is its ease of installation. A detailed worksheet with sample data walks you through every installation step.

Although the CDDM DHCP server is able to lease IP addresses to the devices on the network successfully, it provides only automatic name addressing, not dynamic addressing. For example, for each subnet you can choose a host name for your available IP address in the DHCP pool, and CDDM will assign that name to the new devices as they connect. To keep names separate, CDDM adds a number to the end of each, such as host1, host2, and so on.

Cisco DNS/DHCP Manager 1.0. List price: Tested configuration, \$6,000. Cisco Systems Inc., San Jose, CA; 800-553-6387, 408-526-4000; fax, 408-526-4100; www.cisco.com/dnsdhcp. Circle 951 on reader service card.

Isotro Network Management Inc.

NetID

With a Windows-based management interface, easy-to-define templates, powerful DNS and DHCP servers, and a Web gateway, Isotro Network Management's NetID 2.1 includes everything you need to install and manage an enterprise intranet. Unfortunately, all these features make for a very complicated installation and configuration routine. NetID currently runs on several flavors of Unix and requires an Oracle or Sybase database already installed on your network.

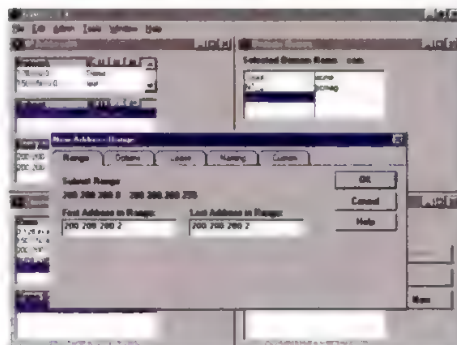
The NetID Admin Tool, DNS and DHCP servers, and Web Gateway are separate modules that make up the NetID Enterprise family. By the time you add all of these modules, the product costs \$18,000 with a 5,000-node DHCP license.

NetID was the most difficult product to install and configure in this roundup. The first thing you must do is install an Oracle or Sybase database. Fortunately, Isotro will resell you a copy of Sybase. After installation, you have to add the NetID users manually and set up the required security. The

final steps involve installing the Sybase Open Client and Admin tool on a Windows-based PC, and then the DNS and DHCP servers on your Unix hosts. Isotro claims to be working on a Windows NT version of the TCP/IP servers, which may be available by the time you read this.

NetID stores all of the DNS names and DHCP IP addresses in the database, which the two servers constantly monitor for updates. Both NetID and QIP provide dynamic DHCP addressing, which means that the DHCP client can use its machine name to update the host name in the DNS server.

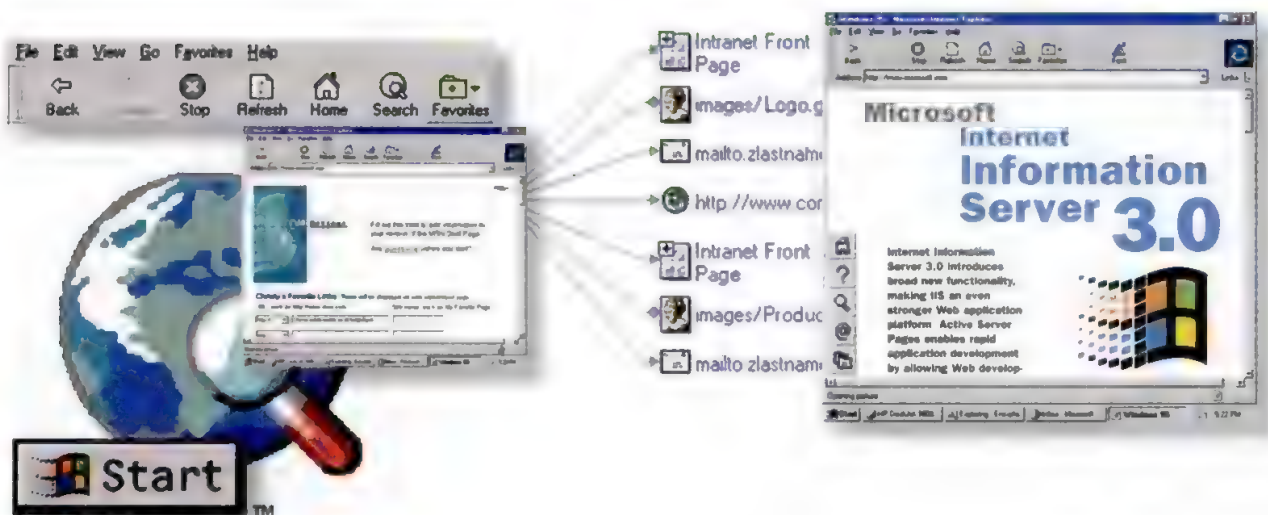
The Admin Tool runs on Windows 3.x,



NetID makes it easy to divide your address ranges into subnets.

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COVER STORY

Windows 95, and Windows NT 3.51/4.0 and performs all of the NetID configuration and management tasks. It's fairly intuitive and uses multiple windows to show you information on your network, subnets, hosts, and IP addresses. You can also create basic text-based reports that provide information on the currently available addresses, leased addresses, and your subnets.

NetID allows you to create templates for adding, deleting, and changing IP information and for subnets and static IP addresses. The Web Gateway is a useful tool for performing basic management tasks from a remote location via a browser. It runs as a Unix application that uses JavaScript to convert the database information into HTML format. You can't perform every function from a browser, but you can make basic changes such as adding, deleting, and updating hosts.

NetID 2.1. List price: Tested configuration, \$18,000. Isotro Network Management Inc., Ottawa, ON; 800-476-8762, 613-722-1921; fax, 613-722-1997; www.isotro.com. Circle 952 on reader service card.

Quadritek Systems Inc.

QIP



Having its own runtime database, DNS and DHCP servers, and Web interface, along with all the management tools you need, QIP is an excellent IP-address management tool for medium-size and large networks. QIP 3.0, from Quadritek Systems, is the first product in this roundup whose servers run on Microsoft Windows NT. Like NetID, QIP offers a Windows-based administration utility and provides dynamic integration between its DNS and DHCP servers. Although the Windows NT version provides a sigh of relief for Unix novices, we did find some bugs in the program. Thus, we gave our Editors' Choice to the Unix version only.

Having most of the same tools and features as NetID, QIP is also a fairly expensive package. Pricing is on a sliding scale starting at \$5 per address for up to 2,000 addresses, progressing to \$2 per address when you have more than 250,000 addresses. The configuration we tested, for 5,000 addresses, is priced at \$22,500.

When it comes to ease of installation, QIP falls between CDDM and NetID. Its installation utility automatically installs the bundled database, unless you have an ex-

SUMMARY OF FEATURES

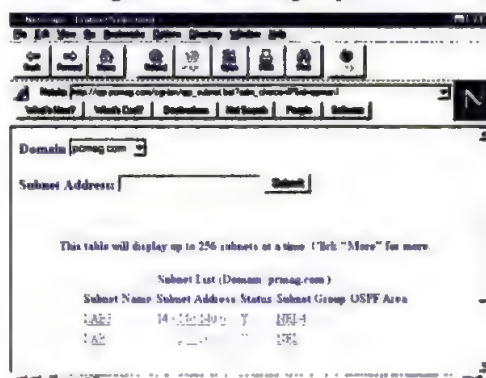
IP Address Management

PC MAGAZINE
NETWORK EDITION
EDITORS' CHOICE

	Cisco Systems Inc. Cisco DNS/DHCP Manager 1.6	Isotro Network Management Inc. NetID 2.1	Quadritek Systems Inc. QIP 3.0*
■ YES ■ NO			
In alphabetical order by company			
List price of tested configuration (5,000 nodes)	\$6,000	\$18,000	\$22,500
Includes DNS server/DHCP server	■ ■	■ ■	■ ■
DNS server runs on Windows NT	■	■	■
DNS server runs on Solaris	■	■	■
DNS server runs on HP-UX/AIX	■ ■	■ ■	■ ■
DHCP server supports BootP	■	■	■
DHCP server runs on Windows NT	■	■	■
DHCP server runs on Solaris	■	■	■
DHCP server runs on HP-UX/AIX	■ ■	■ ■	■ ■
Supports automatic/dynamic DHCP addressing	■ ■	■ ■	■ ■
Imports data from/exports data to third-party DNS servers	■ ■	■ ■	■ ■
Imports data from/exports data to third-party DHCP servers	■ ■	■ ■	■ ■
Dynamically updates DNS server with DHCP server information	■	■	■
Management utility runs on Windows 3.x/95/NT	■ ■ ■	■ ■ ■	■ ■ ■
Management utility runs on Solaris	■	■	■
Includes Web-based interface	■	■	■
Supports SNMP	■	■	■

* The Unix version of QIP 3.0 is our Editors' Choice.

isting Oracle or Sybase database you want to use, and installs the utilities for managing the DNS and DHCP servers. One welcome feature is the menu system that lists commands in the order you need to execute them. For example, you can't create a subnet range before a subnet group.



QIP's Web interface lets you add, delete, and make changes to your IP addresses and servers from a Web browser.

Like NetID, QIP relies on a database to keep track of all the IP address information on the network. Unlike what happens with NetID, however, QIP's DHCP server sends multiple changes to the DNS server at the same time it is updating the database. By making two copies of the data, QIP guarantees that the DHCP information will be saved, even if

the DNS server and database fail.

The Windows NT version is easy to install, but we found in our testing that it was unable to release an IP lease from the database, even when we turned off the client PC and used the Windows 95 IP configuration utility to release the address manually. Fortunately, the Unix version didn't have the same problem, and Quadritek is working on a fix for the Windows NT version.

Like NetID, QIP offers a Web interface. It allows you not only to add, change, and delete hosts and addresses but also to view multiple reports from a browser. QIP uses CGI scripts to convert the database information to HTML. A nice twist to the QIP Web interface is its ability to view reports. You can view reports based on IP usage, host names, and even the MAC addresses of your client PCs. Unfortunately, the Web browser caches

the reports, so when you request another and select Submit, you end up viewing the same one unless you turn off caching in your browser.□

QIP 3.0. List price: Tested configuration, \$22,500. Quadritek Systems Inc., Malvern, PA; 888-683-2254, 610-725-8535; fax, 610-725-8559; www.quadritek.com. Circle 953 on reader service card.

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First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

ISDN ROUTERS

ISDN Routing the Retoura Way

By Les Freed

A small ISDN router with a twist is what Digi International offers in its Retoura Touch Router (\$1,499 for one U interface and \$1,750 for two U interfaces). The twist is two RS-232C serial ports that let you attach one or two analog modems to the router.

The two-line Retoura model also is unusual. Most router vendors sell a single-line router as the remote-office client for larger multiline routers. Those host-side routers usually have at least four or eight lines. If the data traffic in one of your remote offices outgrows the single-line solution, you'll have to pony up the cash for an expensive multiline router. Digi's two-line product offers a middle ground by providing a second ISDN-line connection for only \$250.

What the Retoura doesn't provide is POTS support, and Digi doesn't offer POTS as an option. Many competitive ISDN routers provide one or two RJ-11 POTS jacks, allowing you to use the ISDN line for voice and fax traffic. If you don't need POTS support, however, the Retoura is an excellent choice for remote-office and Internet-access duties.

The Retoura is easy to install and operate. To configure it, you attach a PC to one of the Retoura's RS-232C ports. Once connected, a well-designed configuration menu walks you through the configuration process. A typical installation should take less than 15 minutes, even if you've never installed a router before. Once in-

stalled, the Retoura's menu system provides status information screens that can help track down configuration problems.

A two-line LCD and a touch-sensitive keypad are included on the Retoura's front

bed router. Several other routers we've tested shared the same problem, however ("Fast Routes to the Net," Network Edition, February 4, 1997). A Digi spokesperson told us the problem should be corrected in



Ready, Set, Retoura: The Retoura's two serial ports and two lines make it unique among its kind.

panel. Although the keypad and LCD are provided primarily as monitoring tools, you can perform the entire configuration from the keypad. And you can use the keypad to scroll the LCD through the Retoura's status and configuration information without connecting a terminal.

The Retoura routes IP and IPX traffic. In addition, it supports the PPP and Multilink PPP protocols, so it can be used to connect to virtually any brand of host-side router. During testing of the Retoura with host routers from Ascend Communications and Cisco Systems, we came up with only one hitch: The Retoura was unable to negotiate Stac data compression when connected to Ascend's MAX 1800 test-

bed router. Several other routers we've tested shared the same problem, however ("Fast Routes to the Net," Network Edition, February 4, 1997). A Digi spokesperson told us the problem should be corrected in

a future firmware release. You can attach an analog modem to either of the Retoura's two serial ports. The

modems can be used for out-bound or inbound calls, and they can be used simultaneously with the ISDN ports. This adds an extra dash of flexibility to the Retoura, because you can use the unit as a combination remote-office and dial-up-access router for both ISDN and analog clients.

The Retoura has an excellent suite of call-management features. Like all ISDN routers, it supports dial on demand. In this mode, the router dials the host system when it detects traffic, and disconnects the call when the traffic stops for a specified length of time. The Retoura can also dial and disconnect at specified times on specified days. The two dialing modes work independently of each other, so you can leave the link up for part of the day and then have the router dial as needed at other times.

Retoura Touch Router. List price: with 1 U interface, \$1,499; with 2 U interfaces, \$1,750. Digi International Inc., Minnetonka, MN; 800-344-4273, 612-912-3444; www.dgii.com. Circle 954 on reader service card.

CROSSTALK



Frank Derfler

“ Leon, it took me a minute to understand the Retoura's cool design. I thought the serial connections went to a PC, but this is an Ethernet-connected router. It uses those serial ports to dial analog connections on demand, so they are a great backup-connection alternative for when the telco reprograms its switch and loses your ISDN SPIDs. ”

“ There's more, Frank! If you attach modems to those two serial ports, it's like getting a bonus dial-up-access server. Your home workers and road warriors can dial in without disturbing the ISDN connections. The optional second ISDN line is useful for times when some users are Web-surfing and others need to connect to corporate resources. ”



Leon Erlanger

First Looks

VISUAL COMMUNICATIONS SOFTWARE

Every Picture Tells a Story

By Tony Pompili

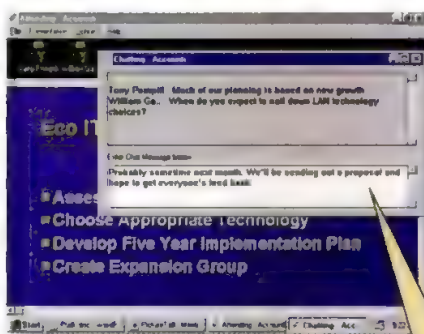
Ever find yourself waving your hands in the air at the other end of a conference call, knowing that with a few graphics you could make your point much more clearly and effectively? With the help of PictureTalk Communicator 1.2 (client software for Microsoft Windows 3.x, Windows 95, and Windows NT), PictureTalk Conference Server, and the Web, you now can enhance your conference calls with real-time, computer-based visual presentations. And part of this product's appeal is that both PC and Mac users can be involved in the meetings.

PictureTalk's system is simple to set up and use, but its PictureTalk Conference Server has a price tag of \$10,000 for a 100-connection license. Although the company designed this software for both single-server and enterprise installations, the price indicates that corporations and large institutions are the real target.

To create, delete, or join a PictureTalk meeting, you either go to the PictureTalk Place, a virtual meeting center on PictureTalk's Web site (www.picturetalk.com), or to the Web server on which you installed Conferencer Server. To create a meeting, you provide a meeting name, specify a time, enter a description, and limit the meeting to a select group by assigning a password. You have to notify attendees yourself; no automated capabilities are built-in.

The PictureTalk client is the component that controls such meeting sessions and launches communication with PictureTalk Conference Server. After a meeting has started and the first graphic has been posted, PictureTalk Communicator captures the image and sends it

to the server. That graphic is transferred with the .PKT extension, which your browser interprets as representing a MIME file. This launches the PictureTalk Communicator software—a plug-in—on the other PCs in the meeting, broadcasting the images from



the server to the other clients.

PictureTalk has labeled this software its client-server-client architecture. Software clients communicate with a software server, which coordinates communication among clients.

Besides being the clearinghouse for image transmission, PictureTalk Conference Server manages traffic flow and

performance and adjusts data compression accordingly, so images are sent at the most efficient rate.

As the PictureTalk clients use TCP/IP to communicate, the PictureTalk Conference Server must be connected to the Internet via your Web server. Although this can present problems for clients that are outside the LAN on which PictureTalk Conference Server is located, the software now works with IP filter, proxy, and SOCKS firewalls.

PictureTalk Conference Server is available for both Windows NT and Sun Solaris. We tested it with flawless results on a Windows NT 4.0 server that had Microsoft's Internet Information Server 2.0 installed. The PictureTalk directories from IIS

Talk, Talk

PictureTalk lets you add much-needed graphical elements to teleconferences.

were created correctly and two Windows NT programs, the Global and Local Meeting Managers, were loaded automatically. The Global Meeting

Manager lets administrators distribute meetings across multiple systems, allowing PictureTalk users to scale their sites as needed.

The simplicity of PictureTalk's architecture carries through to the PictureTalk Communicator application itself. For example, to help identify other attendees, a window lets you see icons associated with them. By double-clicking on an icon, you can see information such as the user's e-mail address and phone number. We found it easy to set up a presentation, and in our test LAN environment, the refreshes of the PictureTalk screens were snappy.

For basic interaction, you type in comments to attendees and see others' comments. PictureTalk also includes a menu option that lets you ask to be made the presenter of an existing meeting, but this proved chaotic when multiple users tried to become the center of attention.

PictureTalk Communicator 1.2 and PictureTalk Conference Server. List price: For 100 user connections, \$10,000. PictureTalk Inc., Pleasanton, CA; 510-467-5300; www.picturetalk.com. Circle 956 on reader service card.

IP MANAGEMENT SOFTWARE

Check on Your IP Network

By Kevin Young

What's worse than your pager going off at 2:00 in the morning with a message that your Web server has gone down? Not getting the page at all because the Web server software—not the hardware—has gone kaput. Most network management products for PCs can tell you almost anything about your server's hardware but little about its software. Enter Baranof Software's IP.Check (\$195), a management tool that is, as the name suggests, specific to the IP world.

IP.Check, which runs on Mi-

crosoft Windows 3.1 or later, Windows 95, and Windows NT, monitors the availability of server applications and produces easy-to-understand statistics on their performance. And it can show you these statistics in graphs that can be saved automatically in HTML format and posted to your Web site. You can see throughput, response time, network availability, and other statistics in easy-to-read bar graphs. Although simplistic, these graphs are useful for demonstrating network uptime to users who may not be as savvy as you would like.

Getting IP.Check up and running is simple. Although we chose not to do so on our tests, if you're willing to accept the default polling scripts, configuration can take as little as 15 minutes.

The setup installs two software components: the poller and the monitor. Using the monitor, you enter the addresses of the servers in your network, which protocols and ports they use, and perhaps a user name and password for protocols such as FTP or POP3. The poller takes these parameters and performs a simple task with them that corresponds to the specified protocol. For instance, on an FTP server, IP.Check will log on with the user name and pass-

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word you have given it and simply issue a help command. If that command returns data, the server is declared normal. If the script fails a user-defined number of times, the server's status changes and an alert pops up on the monitoring station's screen.

The monitor can be configured to take more sophisticated actions, such as sending alerts via e-mail or running a user-defined script. An optional paging alert can be purchased for \$395 or more, depending on the number of authorizations.

As you would expect, different alert actions can be assigned to different servers. For example, IP.Check can page you if your Internet Web server goes down but can be configured to alert you by e-mail if your Gopher server goes down.

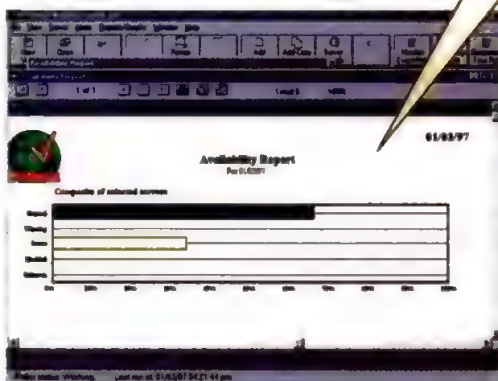
Polling intervals are also user-definable and can vary from server to server. As with the alerts, you may wish to poll your Web server more often than your Gopher server. Blackout periods in which the server is not polled are also definable.

IP.Check covers the standard protocols, such as Finger, FTP, Gopher, HTTP, IMAP4, NNTP, Ping, POP3, SMTP, and telnet, and you can use a proprietary scripting language to poll nonstandard protocols on any port. In addition, IP.Check has a rudimentary network mapping feature. Its only apparent function, however, is to let you use different icons to represent different servers.

As for problems, the Winsock included with Microsoft's stack does not support raw sockets and therefore will not allow you to use the Ping proto-

Check It Out

Graphical reports can be posted to your Web server.



plete a run through the HTTP and Gopher scripts that come with IP.Check. However, these problems can be resolved by tweaking the scripts.

Although IP.Check is not a management panacea for IP networks, it can prove an integral tool in maintaining your mission-critical IP applications.

IP.Check. List price: Base system, \$195. Baranof Software, Watertown, MA; 800-462-4565, 617-926-6626; www.baranof.com. Circle 955 on reader service card.

MULTIPLE ACCESS By Frank J. Derfler, Jr.

Sorting the News



Deciding which news is important isn't easy. Each new product and technical development screams with equal volume. What sound like promises are just plans, and advertised panaceas often turn out to be very system-specific.

The news we're hearing about 56-Kbps modems, digital subscriber loops (DSL), and cable modems is a good example of low-value hype. The joke is that we aren't even the real target. Although apparently talking to you, the DSL and cable companies are really aiming their fluff at stock analysts and money managers. Today, the companies need stock-price support, not real customers with high-speed data.

U.S. Robotics and Rockwell are trading blows to attract Internet service providers into the 56-Kbps arena. The ISPs will be the big buyers of this technology, and their decisions will drive the end users. For you corporate folk, you can't use these 56-Kbps devices behind a private branch exchange, so don't get excited about 56-Kbps links to your corporate cubicals or from traveling employees. Practically, the way to use 56-Kbps devices on a corporate level is to attach a bank of them to a T1 going to the local telco so your employees can dial in from home at high speed without buying ISDN service. That's nice but hardly worth the time in-

volved in sorting through the propaganda.

So, what current news does count? Obviously, anything that makes or saves money. One news area you definitely should follow is network management tools. You should also keep up on frame-relay offerings, because real value is there. And you should understand the value of the network computer and of low-cost computer initiatives.

Management software reduces your need for highly skilled people and improves system reliability. Intel (www.intel.com/procs/index.htm) has some low-hype, high-help white papers on management. Now that servers are more than just PCs turned on their sides, server management products are useful. It's worth reading about Compaq Computer Corp.'s Insight Manager, Hewlett-Packard Co.'s HP NetServer Assistant, and IBM Corp.'s NetFinity.

Your wide-area links are a wide-open way to reduce costs and improve productivity. AT&T, MCI, and the regional carriers want your frame-relay business. They're adding services and making deals. If you have any leased lines left, look at replacing them with frame relay. Although many people let their service providers install the client hardware for WAN links, you should look into the CSU/DSU diagnostic hardware from Visual Networks (www.visualnetworks.com).

And finally, you should know about network computers. Simply put, they are mainframe terminals for the 1990s. Think of them as 3270, 5250, and VT-220 replacements. Use them where they make sense.

Separating the hype from the help is no easy task. My advice: Keep money in mind.



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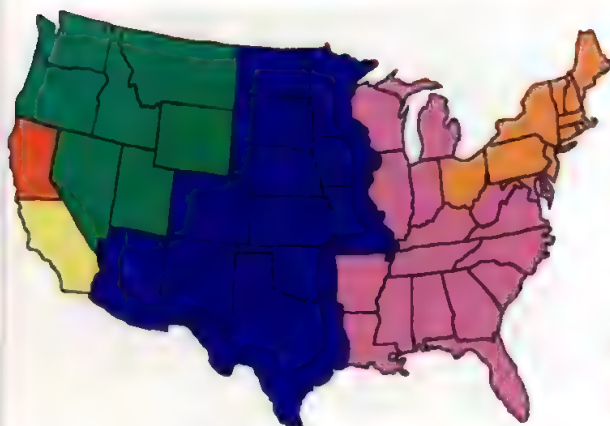
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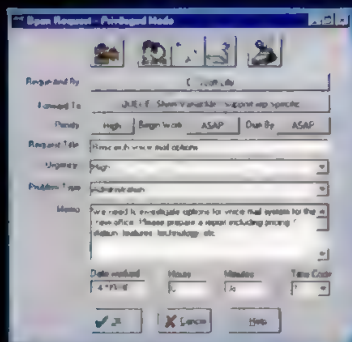
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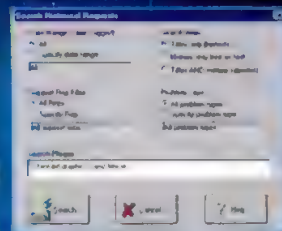
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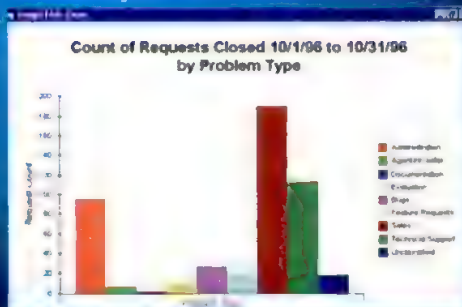


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8:02AM—"Mr. Lawson, the Chairman wants to see your quarterly report in his office. The one with the singing and dancing pie charts. By 11 AM. Sharp."

8:05AM—"Help me out, Tom. The Engineering VP wants to copy our schematics this morning. Can you take your notebook there and use your Fast Infrared port?"

8:22AM—"Mr. Lawson, just a reminder, 9:30 video conference with the Frankfurt office. They received the spreadsheets you e-mailed yesterday."

8:34AM—"Thanks for those schematic files, buddy. By the way, your new notebook's under 5 pounds and mine's almost 9. You're giving me 4 strokes on the golf course, pal."

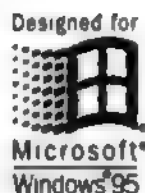
9:17AM—"Lawson, the CIO says 100BaseT Fast Ethernet is the way to go for our new office downtown. Your new notebook can access the network easily."

10:15AM—"Tom, the data you need is on multimedia CD. Bring your notebook to Marketing."

10:33AM—"Guten Morgen, Thomas. Very good conference call this morning. Sales are up as your analysis predicted. The spreadsheets really helped."

11:30AM—"Tom, this is the Chairman. Great presentation. You're going to our test site in the Mojave Desert with the Engineering VP, my friend. It's a full day of meetings, so bring an extra battery and a sleeping bag. There's no electricity."

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INSTRUMENTS**



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PERSONAL WEB-PAGE EDITORS

GRAND DESIGNS

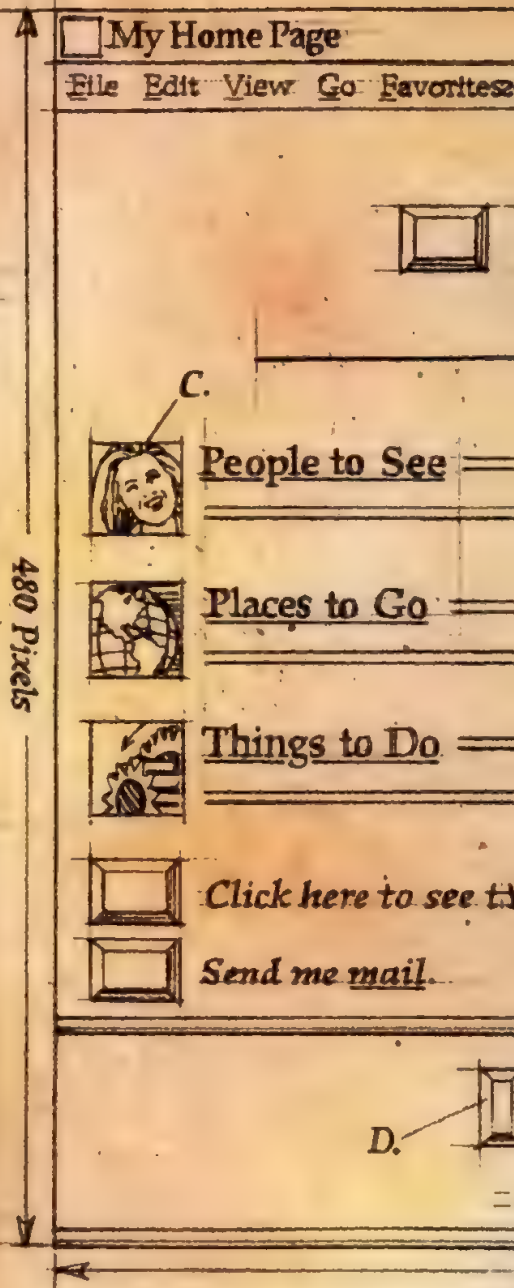
It's time to stop calling them *HTML* editors. These programs hide the code to let anyone create stunning pages.

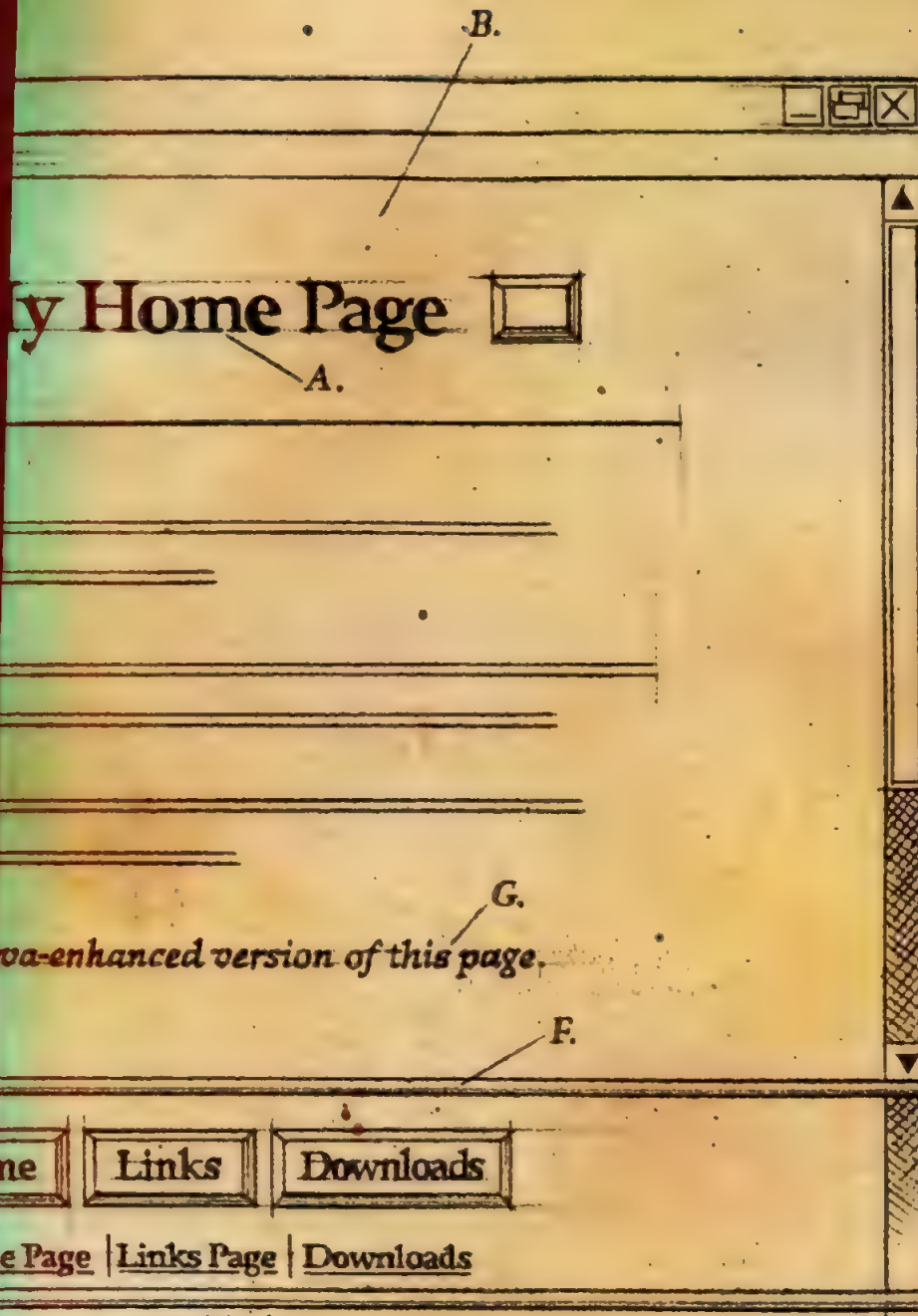
By Edward Mendelson

The Internet's roots are in plain, text-based documents, but even the last vestige of that legacy is fast slipping away. Only a year ago, if you wanted to create pages for viewing over the Web, you probably used a program that displayed nothing but plain text and obscure HyperText Markup Language (HTML) codes—as opposed to graphics and formatted text, so that pages would look as they'd appear in a Web browser like Netscape Navigator or Microsoft Inter-

net Explorer. Today's more advanced programs, however, show your pages almost exactly as they appear in your browser. In the same vein, the HTML editor you used a year ago created separate pages. But today's best HTML editors build complete, interlinked Web sites and can upload them to remote Web servers when users are ready to present their pages to the world.

During the past year, HTML editing software evolved in the same way that word processing software evolved a decade ago. The first generation of word processors comprised character-mode





A Basic Blueprint

Your Web page says a lot about you—mainly, how tuned in you are to HTML design. Here we list rudiments of building good Web pages, along with this rule of thumb: Just because you can do it doesn't mean you should.

A. Text and hypertext links should be readable against the background. Use proper spelling and punctuation.

B. Background colors and patterns help a page stand out, but they can be in the way if they make it hard to load or read. Bear in mind that many readers will be viewing your page at 256 colors, so any higher-resolution colors will be lost and may create undesirable effects.

C. Graphics and animation can brighten a page, but keep them simple for quick downloading. Avoid busy animations and blinking text.

D. Navigation links at the bottom of each Web page provide a guide so your readers won't get lost. Provide text-only links for users who turn off graphics loading in their browsers to improve speed.

E. Page dimensions should be no larger than the browser window size; keep in mind that many readers have their screen resolution set to 640 by 480 pixels.

F. Frames can make navigation easier, but more than a few can make your page difficult to read. Also, build a nonframe version to accommodate all browsers.

G. Applets and plug-ins can enable visual tricks and features beyond the capabilities of basic HTML, but we don't recommend heavy use of proprietary extensions.

IN THIS REVIEW

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programs, which in many instances displayed codes like ^B and ^I instead of boldfaced or italicized text. Products in the current generation of graphics-based word processors display pages exactly as they will look when they are printed out. Character-mode word processors still have a loyal following among users who don't want to be distracted by graphics or who want complete control over formatting codes.

In the same fashion, code-based HTML editors are giving way to graphics-based editors. Our previous roundup

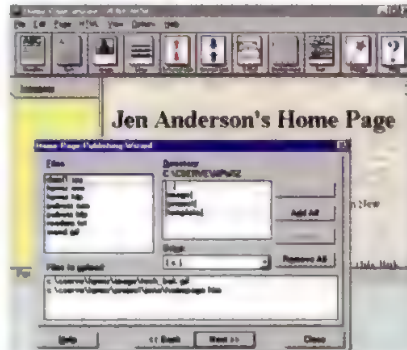
of HTML editors ("Web Authoring," September 10, 1996) included several text-based products. Mainstream users prefer to use the more modern visual editors; though the text-only products still have a following among Webmasters who want to control every detail of their files. (For a look at some of these products, see the sidebar "Text-Based HTML Editors: Know the Code.") And even with the latest graphics-based editors, users may have to enter obscure filenames and other strings to use advanced features like Java applets, ActiveX controls, and scripting.

Putting Your Pages Online

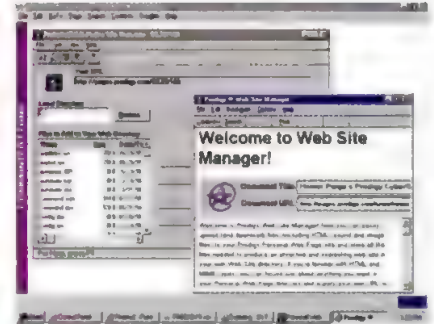
The final step in publishing your HTML pages is putting them on a Web server that's connected to the Internet. For individual users, the easiest way to obtain access to one is through an online service or Internet service provider (ISP) that offers its members Web server space. We've compiled tips on using America Online, CompuServe, and Prodigy Internet to publish your pages worldwide.



AMERICA ONLINE Start with the keyword Personal Publisher or go to *home.aol.com*. You can then choose My Home Page, for novice users, or My Place, aimed at the more experienced. My Place lets you upload multiple pages and offers a wide selection of HTML editors for downloading (including AOLpress), as well as a user-friendly menu of help items. AOL provides up to 2MB of server space for each user or 10MB per account.



COMPUSERVE After downloading CompuServe's Home Page Wizard (type "Go hpwiz"), you can use the wizard's graphical editor to create text and graphics. You can preview the pages in any selected browser, then use the Publishing Wizard to upload the files you choose. CompuServe allows up to 2MB of text and files.



PRODIGY INTERNET Type the keyword "Personal Web Pages" to get to Prodigy's page creation area, which contains a basic HTML tutorial and support bulletin boards, as well as downloadable shareware HTML editors and Prodigy's text-based editor, Hippie 4.10. After you create pages off-line, the Personal Web Pages Site Manager allows you to upload up to 1MB of text and images to the Web.

NOW YOU SEE IT

In this roundup, *PC Magazine* reviews ten Web-page editors suitable for personal and small-business use. More expensive programs designed for large-scale corporate use are considered in the sidebar "Enterprise Web Authoring Tools." All the programs are graphical, so you never have to see raw HTML code, although several offer special edit-

ing windows for experts who want to view or modify the code underlying their documents. These products have interfaces that are, to coin a phrase, What You See Is More Or Less What You Get, because every browser interprets HTML code differently. One editor that did not make our roundup is worth noting: the much-anticipated Adobe PageMill for Windows, which was unavailable in time

for our story but should be available for purchase by the time you read this.

These graphical editors automatically create valid HTML files, and some can automatically correct any syntax errors in files you import from other sources. Different programs react in different ways to incorrect syntax in imported files. AOLpress, at one extreme, silently corrects even egregious errors in imported files.

PERSONAL WEB-PAGE EDITORS

How to Read the Suitability to Task Boxes

Simple page creation We look at the basic HTML capabilities of each product. We require that each product support HTML Level 2 tags (headings, other text formatting, images, horizontal rules, and hypertext links). The products should provide wizards and templates to help users unfamiliar with Web pages get a quick start. We award high ratings to products that allow users to customize menus and toolbars, and we consider each product's ability to import different file formats.

Complex page creation We rate each product's ability to generate more advanced HTML. We consider whether the product supports HTML Level 3.2, Microsoft and Netscape HTML exten-

SUITABILITY TO TASK		
Product Name	Power	
	Power	Ease
Simple page creation	Good	Fair
Complex page creation	Excellent	Excellent
Publishing	N/A	N/A

N/A—Not applicable: The product does not have this feature.

sions, tables, and frames. If the product includes a graphics editor, we rate its features and consider whether it includes a client-side image-mapping feature. We expect the product to allow users to edit native HTML code, and we examine how the product verifies HTML tags and deals with unsupported tags and syntax errors. We also consider whether the

product can retrieve HTML pages and graphics from a Web site and whether it allows users to edit files directly on a Web server.

Publishing We rate the tools and features each product includes for posting elements on the Web. We consider the product's FTP or HTTP Put capability and note whether the product lets you use absolute or relative pathnames. We also consider whether the product includes an offer for a Web server hosting service and look at any included tools that work in conjunction with that service. We give extra credit to products that can display a graphical map of your Web site and verify hypertext links automatically.

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At the other extreme, HoTMetaL Pro forces you to edit some pages by hand until they conform to the program's strict SGML-style interpretation of the rules of HTML syntax.

All of these HTML editors make it easy to create pages with complex formatting and imported graphics. You may want to choose a program that automatically converts graphics files from formats not supported by most Web browsers, like TIFF and .BMP, into Web-standard formats, like .GIF and JPEG. (See "Web Graphics Tools" in this issue for more info on editing graphics.) Any HTML editor can create hyperlinks between a current page and other pages on the same site or a remote server, but only some programs—check our Summary of Features table—will verify that your link points to a page that actually exists.

Some of these programs create and manage Web sites in addition to creating individual pages. Packages like AOLpress and FrontPage 97 were designed from the ground up to build interconnected pages that use the same graphics and other design elements on every page. These packages, and others focusing on individual pages, include features that upload pages or entire sites to a remote server; some let you rename or delete files on the remote server as well as upload pages to it.

HTML editors may be an endangered species. The latest versions of the three major Windows word processors—Corel WordPerfect 7.0, Microsoft Word 97, and Lotus's Word Pro 97—all include HTML editing and site management features once available only in specialized software (see the sidebar "World-Wide Word Processors"). Though today they lack many HTML-specific features, word processors have long since swallowed up whole software categories like outlining software, and there's a real possibility that separate HTML editors won't exist a few years from now. In the meantime, the pro-

Editors' Choice

• Microsoft FrontPage 97



Visual HTML editors are now a mature category. Microsoft FrontPage 97 stands out for its ability to create complete Web sites and high-impact pages.

FrontPage 97 has automated features you won't find in any other product, such as WebBots, which perform tasks normally requiring arcane programming skills. This product—which includes an outstanding graphics editor, a desktop Web server, and complete publishing facilities—offers unequaled ease of use. No other program lets you create a Web site with as much consistency and convenience.

An honorable mention goes to AOLpress 1.2.3. While it doesn't match the ease of use of FrontPage, AOLpress is nonetheless a powerful tool for building complex sites. AOLpress's editing window doubles as a Web browser, so you can copy and paste links and graphics from within the program. Pages in a site form a MiniWeb, a feature that lets you make the site very elaborate. And after a learning period, AOLpress lets you ef-

fortlessly perform complex tasks, such as building tables. In the communal spirit of the Internet, the product is downloadable for free, regardless of whether you're a member of America Online. It is one of the best bargains in the world of software.

Other impressive Web page editors are Corel Web.Designer 1.2 and Thunder & Lightning Co.'s Web Factory Author 3.0, which provide powerful visual HTML editing tools for both beginners and advanced users.

For creating single HTML pages, you should consider Netscape Composer, the sleek and intuitive HTML document editor built into the Netscape Communicator suite. It's an improvement on the editor in Netscape Navigator Gold 3.0. In addition, the latest Windows word processors allow basic HTML editing, though they don't provide many rich HTML-specific options.

grams in our main roundup have all the tools you need to create and maintain info-packed, dazzling pages.

THE ROAD TO THE CODE

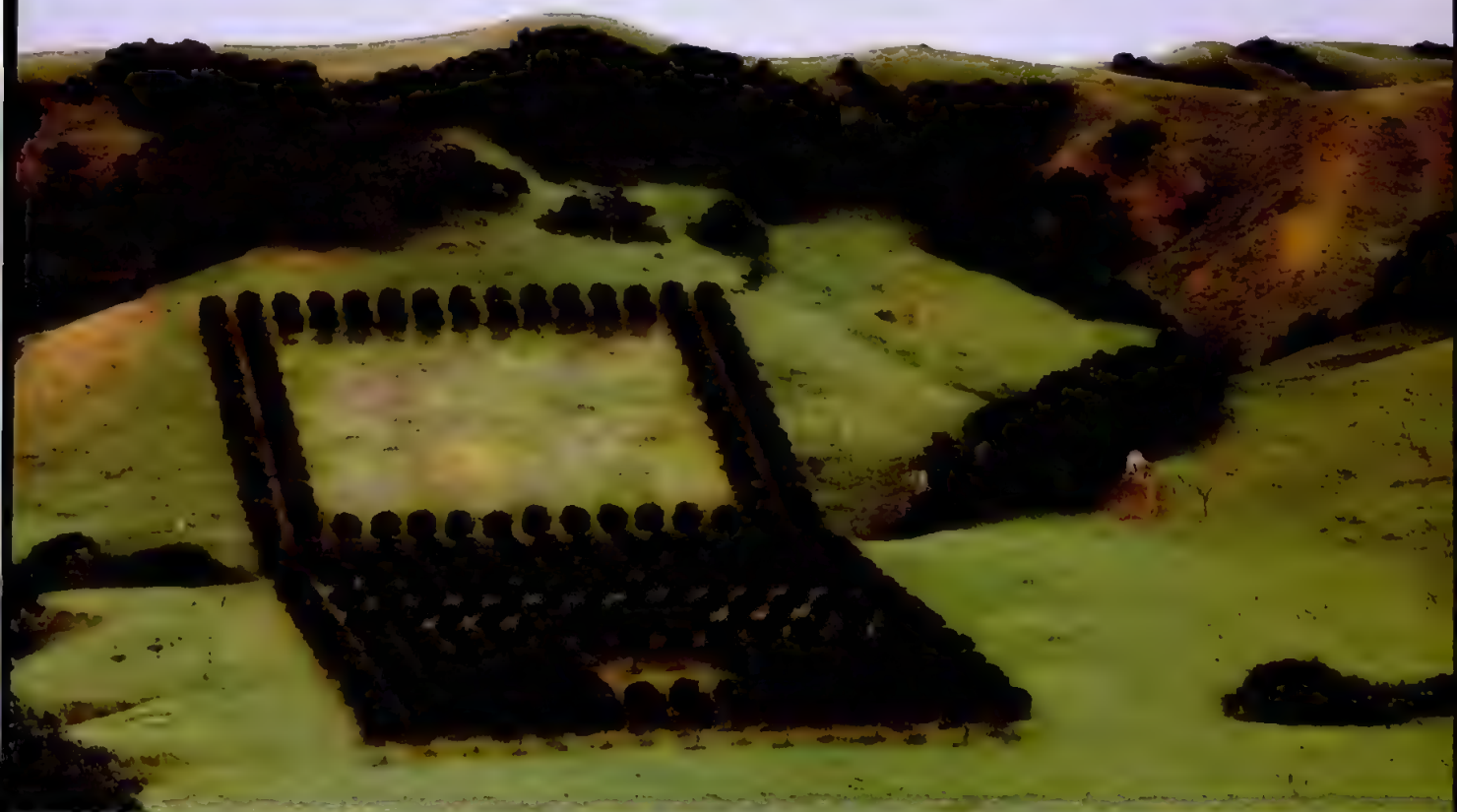
To understand the complex issues involved in choosing and using an HTML editor, it helps to know something about the history of HTML, especially the conflict between those who think HTML should describe a document's *structure* and those who think it should describe its *appearance*. HTML started in 1989 when Tim Berners-Lee devised it as a simple, informal specification for displaying plain text and hyperlinks in character-mode Web browsers. In-line graphics were

added four years later with the introduction of NCSA's Mosaic (www.ncsa.uiuc.edu), the first graphics-based browser. In 1994, the first World Wide Web conference initiated an effort to turn HTML into an exact specification, and work began on the HTML 2.0 standard. (There was never an HTML specification numbered 1.0.)

HTML 2.0, which added interactive forms to the specification, also tried to give HTML the same kind of rigidly defined structure found in the Standard Generalized Markup Language (SGML) and defined HTML 2.0 as an SGML document type. SGML defines only the *relationships* between different kinds of text such as headers, quotations, and lists; it says nothing about the *appearance* of the text. SGML purists in the Web community wanted HTML to use only the kind of codes that indicated, for example, that a block of text was to be "emphasized"—instead of tags that indicated the text was

Our Contributors: EDWARD MENDELSON is a contributing editor of *PC Magazine*. KAREN J. BANNAN is a staff writer and JOHN CLYMAN is a senior technical editor for PC Magazine Online. BEN Z. GOTTESMAN is a technical director, AMY LEUNG is a technical analyst, and CADE METZ is a staff writer at *PC Magazine*. TODD SPANGLER was the associate editor in charge of this story, and JAY MUNRO was the project leader.

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Enterprise Web Authoring Tools

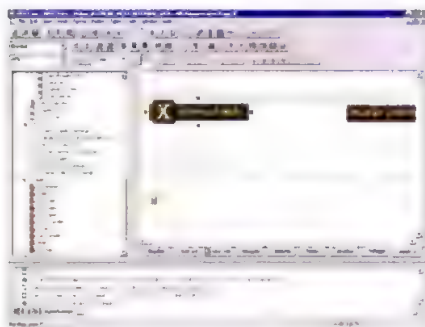
By John Clyman

The division between personal and professional Web authoring tools is sometimes fuzzy: Much of the software could well be identical. Nevertheless, there are some industrial-strength tools—not just simple HTML editors, such as those in our main roundup—and for many enterprise applications, they are a necessity.

We examined prerelease versions of three packages that tackle different aspects of enterprise Web development: HAHT Software's HAHTsite 2.0, Microsoft Visual InterDev 1.0 (formerly Internet Studio), and NetObjects Fusion 2.0. We reviewed HAHTsite 1.0 in our issue of September 10, 1996; we covered NetObjects Fusion 1.0, awarding it an Editors' Choice, in the First Looks section of our issue of November 19, 1996.

The products' differences are more notable than their similarities. NetObjects Fusion 2.0 is the closest to a traditional Web authoring tool, but it uses a powerful desktop publishing metaphor that sets it apart from run-of-the-mill HTML editors. At the opposite end, Microsoft positions Visual InterDev as a tool for building Web-based applications that can generate HTML pages dynamically. HAHTsite has aspects of both worlds, serving as a comprehensive solution with everything from a passable visual HTML editor to its own integrated development environment (IDE) for developing and deploying server-hosted applications.

For professional design and site development, NetObjects Fusion 2.0 is the standout. For developing true Web applications, HAHTsite and Visual InterDev are comparable, but HAHTsite gains an edge by supporting a far broader range of server APIs. Visual InterDev requires Active Server Pages support, available only with Microsoft Internet Information Server 3.0 for Windows NT Server 4.0, whereas HAHTsite runs on a variety of plat-



HAHTsite 2.0 allows both code generation and visual HTML editing.

forms and supports CGI, Netscape's NSAPI, and Microsoft's ISAPI.

The packages share one trait: Like most beta software, each exhibited bugs in our testing, though they were generally minor ones that we expect to be resolved in the final versions.

HAHTSITE

Developers of Web applications that require on-the-fly generation of HTML pages will find HAHTsite 2.0 a full-fledged solution. Its IDE includes a basic HTML editor (though you can use your own), a capable image editor, and relatively sophisticated tools for scripting client-side and server-side behavior.

Like most applications development tools, HAHTsite organizes material within projects. A project can contain Web pages, images, database connections, named links to frequently referenced external resources, and code. Endowing HTML pages with dynamic components is simple. HAHTsite includes a number of Widgets, prebuilt code that lets you perform actions such as inserting date/time stamps, retrieving data from SQL databases, and generating context-sensitive navigational bars.

HAHTsite's interface can seem cluttered, and its site view is rather clumsy compared with the other packages'. But in its delivery of working Web applications, it doesn't disappoint.

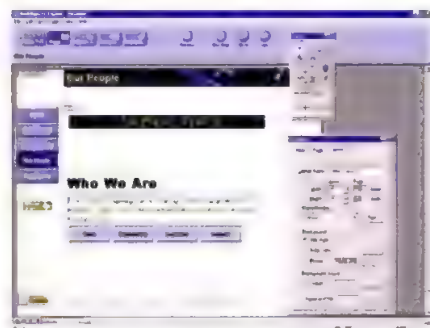
HAHTsite 2.0. List price: \$995. HAHT Software Inc., Raleigh, NC; 888-438-4248, 919-786-5100; www.haht.com. Circle 481 on reader service card.

MICROSOFT VISUAL INTERDEV

Microsoft Visual InterDev 1.0 is a distant descendant of Microsoft's ambitious Blackbird authoring environment, conceived as a platform for building interactive content for The Microsoft Network when MSN was a proprietary, non-Web-based service. Visual InterDev is built around the Microsoft DevStudio IDE used in Visual C++ and Visual J++, enhanced with a streamlined, Office 97-style look and feel. It has a variety of useful components, such as Microsoft Image Composer and Microsoft Media Manager.

Like HAHTsite, Visual InterDev organizes sites on the basis of projects. You can edit HTML pages directly using the environment's color-coded HTML editor. Visual InterDev incorporates a graphical link browser similar to FrontPage 97's Explorer, and it offers the unique ability to preview the pages you create within its own IDE.

But this package focuses on building Active Server Pages: HTML pages with ActiveX scripting commands that tell a server to perform certain tasks (such as accessing a database) before delivering an HTML page to the client's Web browser. The product's design-time ActiveX controls, similar to HAHTsite's Widgets, are especially strong for



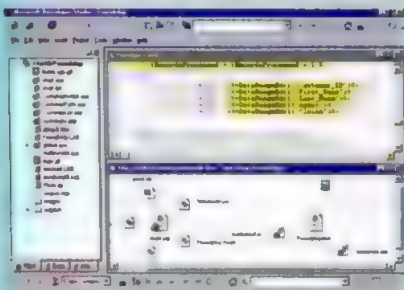
Microsoft Visual InterDev 1.0 is designed for developing dynamic Web pages.

accessing live databases (which can reside on any server) from Web pages. There is also a script wizard to help you generate client-side script in JavaScript or VBScript.

Microsoft Visual InterDev 1.0. List price: Not yet announced. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; www.microsoft.com/vinterdev. *Circle 482 on reader service card.*

NETOBJECTS FUSION

Unlike HAHTsite and Visual InterDev, NetObjects Fusion 2.0 has no substantive server component, so it is no help for developing truly dynamic,



The precision of NetObjects Fusion 2.0's desktop publishing-style layout engine is unparalleled.

data-bound Web pages. It does offer easy-to-use database-publishing tools that may suffice for many purposes. On the whole, Fusion is a standout product that professional site designers should consider, especially in Version 2.0.

The product's desktop publishing layout metaphor allows pixel-perfect page designs. Fusion 2.0 lets you create HTML frames easily and precisely, and it adds MasterBorders—page-style definitions you can apply to an entire site for a consistent, easily maintained look. Fusion 2.0 can generate navigational bars automatically, and it has a variety of Java-based components, including a ticker and a slick site map.

NetObjects Fusion 2.0. List price: \$695. NetObjects Inc., Redwood City, CA; 888-449-6400, 415-943-4048; www.netobjects.com. *Circle 491 on reader service card.*

to be in "italics." It would be up to the individual Web browser to decide how "emphasized" text would appear. But companies like Netscape and Microsoft—and the majority of users—wanted the Web to use complex graphics, specified fonts, and other multi-media effects, which could only be specified in codes that told the browser the exact physical appearance to display.

When the HTML 3.2 specification was introduced last year, it was clear that Netscape and Microsoft had won the battle. HTML 3.2 includes support for tables, which Netscape and Microsoft had supported for some time but which had never been officially recognized in HTML 2.0. HTML 3.2 also introduces support for embedded applets and formalizes support for features like font specifications and background colors, which browsers have long supported. Every Web-page editor here supports most if not all of the tags defined in HTML 3.2 (with the exception of MySoftware's MyInternetBusinessPage, which supports only HTML 2.0).

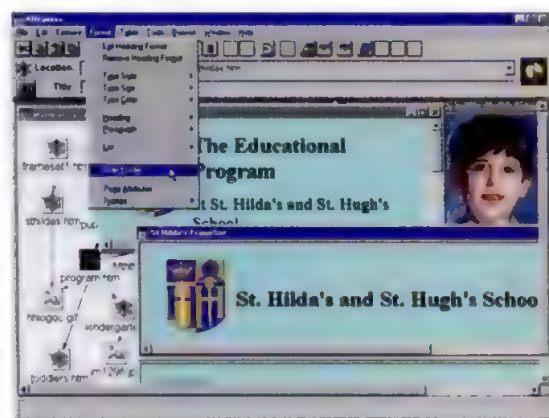
Frames are still not included in the HTML specification, though Netscape Navigator and Microsoft Internet Explorer have made them part of the de facto standard. The next version of HTML, tentatively called HTML 4.0, will probably include the Cascading Style Sheet (CSS1) standard, which lets Web authors specify fonts, sizes, and colors as named styles that can be applied anywhere in a document—instead of requiring that a font be specified in full wherever it is used throughout a Web page.

The different flavors of HTML are important, because it's possible to create Web pages that will fully display in only one or two browsers. To reach the widest audience, you will want to avoid most of the Netscape and Microsoft extensions to HTML and make certain that your files conform to standard HTML syntax.

America Online Inc.

AOLpress

America Online doesn't charge anything for AOLpress 1.2.3 (except \$19.95 for a printed manual), but this full-featured HTML editor and Web site publisher matches the power, if not the convenience, of most of this roundup's full-priced packages. The program's menus and dialogs aren't intuitive, and you won't find automated wizards to give you a fast start in creating your own pages. But once you learn the basics, AOLpress makes it easy to create and manage Web sites.



AOLpress 1.2.3 maps your site's structure and links and displays your Web pages in separate editing windows.

AOLpress's interface is designed more for expert users than for beginners. Commands for formatting and for other features are accessible through menus and shortcut keys, and the toolbar includes buttons for a few basic commands: copy, paste, and check links. You can open multiple pages in separate editing windows, and you can open a separate window for editing a page's raw HTML code. When you insert a link to a page that you haven't created yet, AOLpress offers to create the page for you, and every page that you create becomes part of a MiniWeb that you manage from a diagram displaying all your links. The editing screen is also a full-featured Web browser, so you can easily

open any Web page and cut and paste its text and graphics into your own pages.

When you work in the special window for managing a

SUITABILITY TO TASK

AOLpress

	Power	Ease
Simple page creation	Excellent	Fair
Complex page creation	Excellent	Fair
Publishing	Excellent	Excellent

Text-Based HTML Editors: Know the Code

By Amy Leung

If you are already fluent in HTML or if you prefer to work with your source code directly, text-based HTML editors put you in touch with the language behind the Web page and provide extra control. We looked at three popular text-based editors that allow you to come face to face with your HTML: HotDog Professional 3.0, HTML Assistant Pro 97 1.0, and WebEdit Pro 2.0.3.

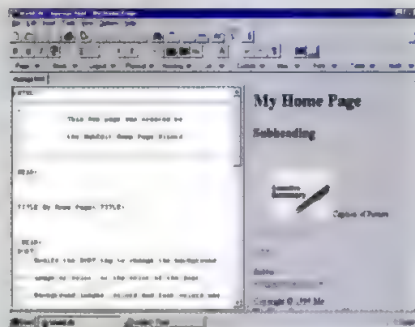
With text-based editors, you can use new extensions much more easily than with graphical editors. The latter may allow only an approximate view of the page and can incorporate newer extensions only in revised versions.

Don't think text-based editing means you'll have to do *all* your coding by hand in the manner of Windows Notepad. These products offer plenty of assistance, with such useful features as auto-inserting tags, color-coded displays, and easy-to-use toolbars, wizards, and dialog boxes. Of the three editors reviewed here, each lets you create sophisticated Web pages, but WebEdit Pro provides the most attractive range of features, ease of use, and customizability.

HOTDOG PROFESSIONAL

The latest release of Sausage Software's popular HotDog Professional—distributed by Anawave Software—will appeal to beginner and professional alike, with an easy-to-use interface and powerful editing features. The word processor-like interface is easy to navigate and customize. HTML tags are color-coded for easy tracking, and you can drag and drop files to insert images or links into your Web page. You can view your page using the included Rover viewer or any Web browser you select. Built-in validation tools check code syntax and background colors; an included FTP utility uploads your finished Web project.

Impressive new features in Version 3.0 of HotDog Professional include



WebEdit Pro displays the HTML source code and the output view in side-by-side windows.

support for advanced formatting extensions, including Java, JavaScript, and frames. The Snaglet tools let you create frames, image maps, text effects, and animations. We also liked the Bandwidth Buster (not available with HTML Assistant Pro or WebEdit Pro), which tells you your page's size and lets you reduce it by converting graphics files from .GIF to JPEG format.

HotDog Professional 3.0. List price: \$79.95 (Version 2.53 with free upgrade). Anawave Software Inc., Newport Beach, CA; 800-711-6030, 714-250-7262; www.anawave.com. Circle 488 on reader service card.

HTML ASSISTANT PRO 97

HTML Assistant Pro 97 (\$99.95) is the newest version of Brooklyn North Software Works' editor. This 32-bit version for Windows 95 and Windows NT now offers support for long file names and ActiveX, Java, and JavaScript languages. HTML Assistant Pro provides a more bare-bones interface than the other text-based editors. If you regard toolbars and buttons as clutter, this product has the clean workspace you are looking for. But the product does offer the flexibility of user-definable buttons and toolbars.

HTML Assistant Pro includes one superb new feature: 255 levels of undo and redo. Another nice addition is that this version lets you convert word processor documents saved in rich text format into HTML documents—

tables, formatting, and all. HotDog Professional and WebEdit Pro allow you to import only ASCII text.

HTML Assistant Pro 97. List price: \$99.95. Brooklyn North Software Works Inc., Halifax, Nova Scotia, Canada; 800-349-1422, 902-425-0900; www.brooknorth.com. Circle 489 on reader service card.

WEBEDIT PRO

Luckman Interactive's WebEdit Pro 2.0.3 (\$49 list) is a 32-bit release for Windows 95 and Windows NT. WebEdit Pro, which Luckman recently acquired from Nesbitt Software, is also packaged with Luckman's tool suite, Web Studio, and server software, Web Commander.

WebEdit Pro sports a well-designed interface with clearly categorized tabbed menus and tool buttons. We liked the ability to view code and Web-page output in parallel panes, avoiding the hassle of sizing the floating windows you'll encounter in HotDog Professional or HTML Assistant Pro. You can use handy shortcut keys for most common HTML tags and add custom tags easily to the menus. The Open from Location feature lets you edit directly on the Web, and FTP Upload lets you transfer files from your local machine to a Web server.

We particularly liked the intelligent wizards for creating frames, a table of contents, and multimedia effects. The extremely flexible Frame Wizard lets you create frames by simply dragging to define their location and size, as opposed to the predefined frame layouts provided by the other tools here.

Customers looking for the ActiveX capabilities found in HotDog Professional or HTML Assistant Pro, however, will have to wait for the next release of WebEdit Pro.

WebEdit Pro 2.0.3. List price: \$49. Luckman Interactive Inc., Los Angeles, CA; 800-711-2676, 213-614-0966; www.luckman.com. Circle 490 on reader service card.

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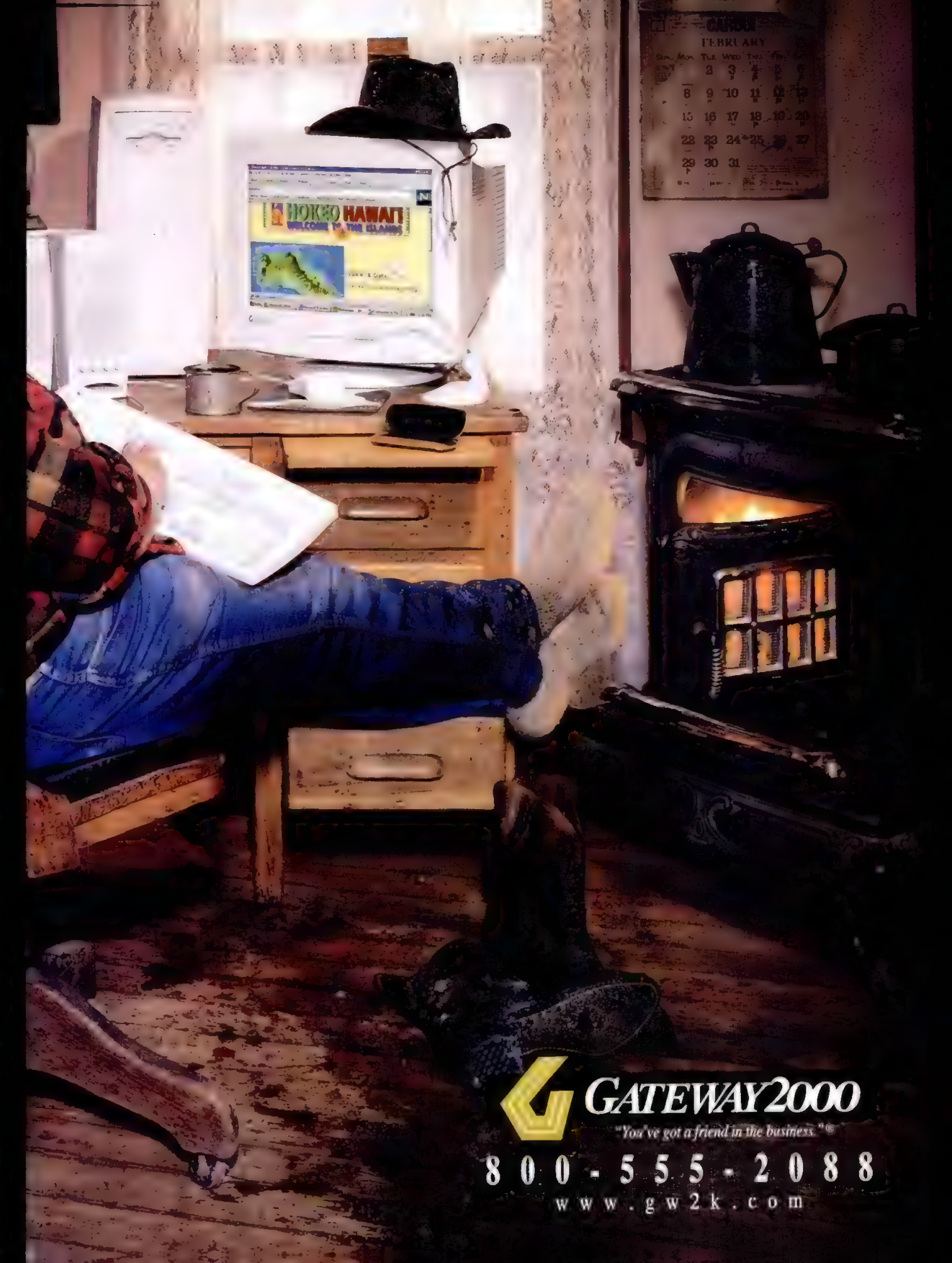
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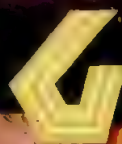
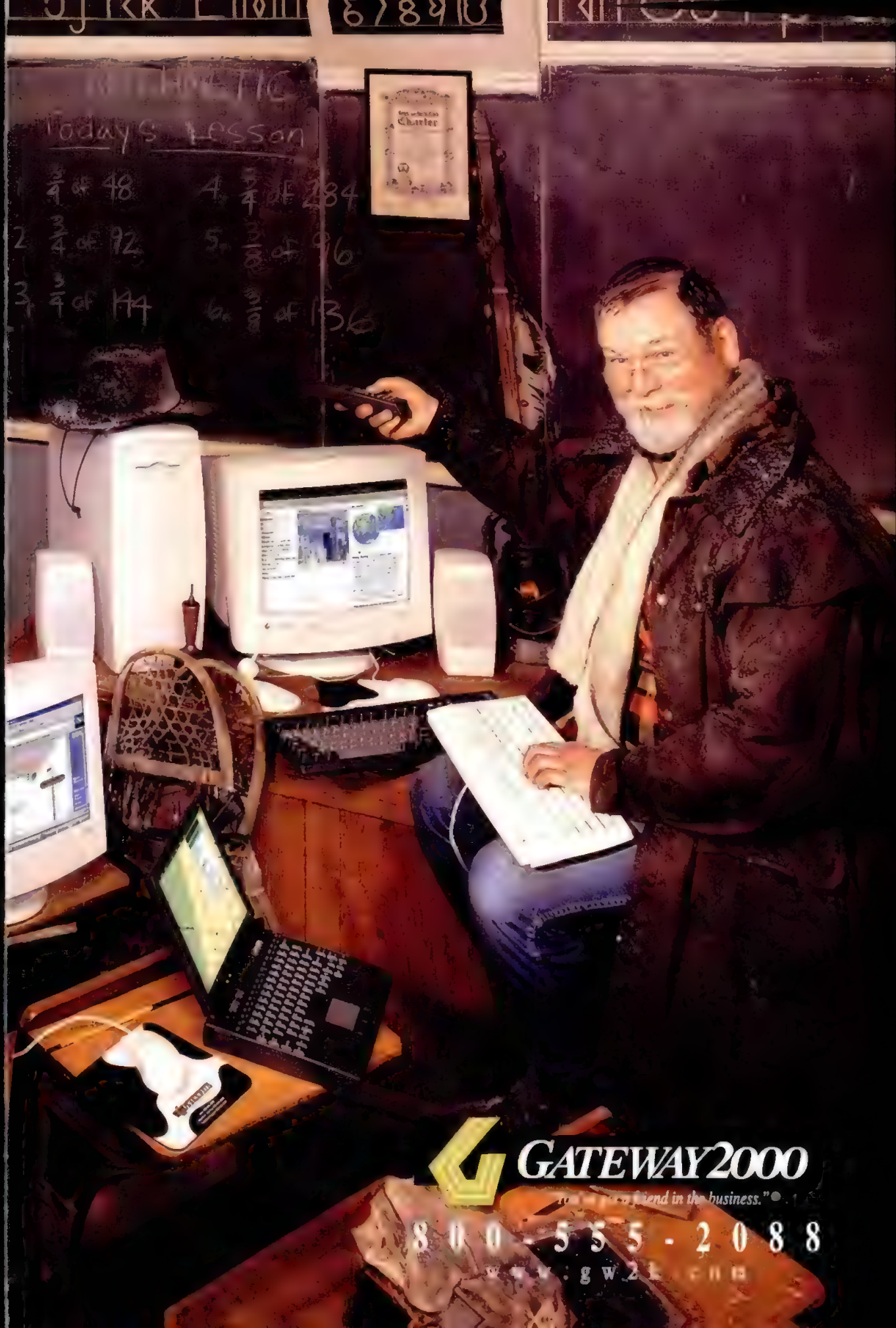
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Gateway 2000 Quality Management Systems for Customer Hardware Support, Sioux Falls, South Dakota; Desktop & Portable Manufacturing Divisions and Remanufacturing in North Sioux City, South Dakota, are ISO 9002 certified.



pentium

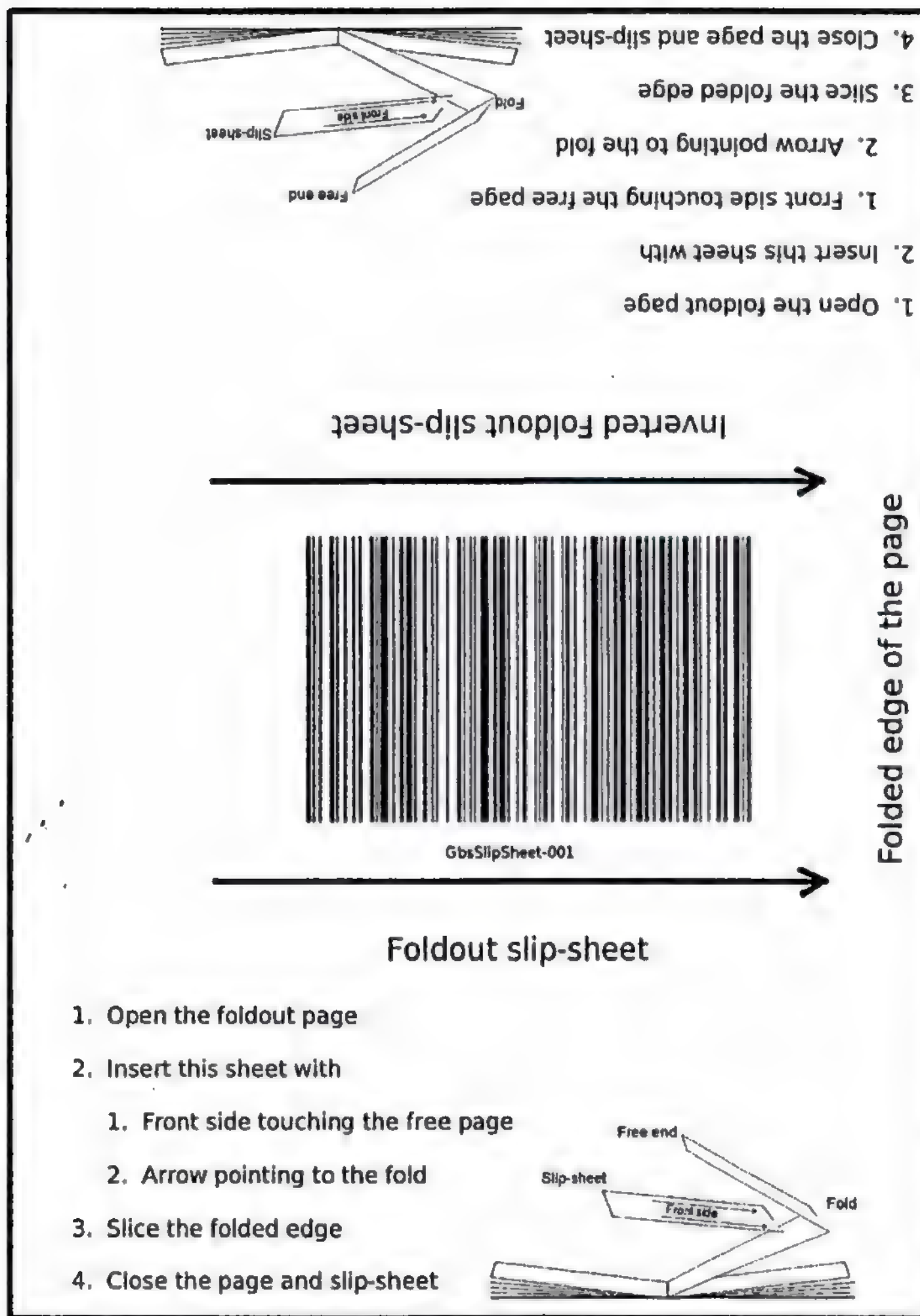


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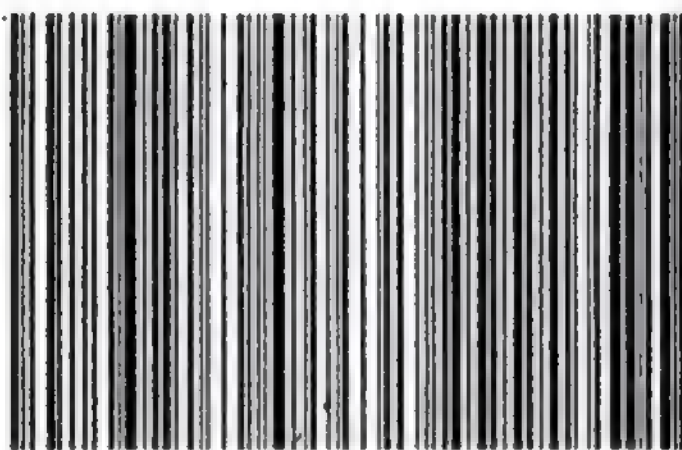
800-555-2088

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1. Follow instructions on the other side

Inverted Back



GbsSlpBack-0018

Back

1. Follow instructions on the other side



Multimedia Systems

P5-133 FAMILY PC™

- Intel® 133MHz Pentium® Processor
- 16MB Synchronous DRAM
- 256K Pipelined Burst Cache
- CrystalScan®500 .28dp Monitor (13.9" viewable area)
- 2MB SGRAM, 3-D 64-Bit PCI Graphics
- 1.2GB 11ms EIDE Hard Drive
- 12X CD-ROM/3.5" Diskette Drives
- 16-Bit GATEWAY™ Sound
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- Mini Tower Case
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- Generations III Software Collection
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\$1599 As low as* \$55/mo.

P5-166 FAMILY PC

- Intel 166MHz Pentium Processor with MMX™ Technology
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- CrystalScan700 .28dp Monitor (15.9" viewable area)
- 2MB SGRAM, 3-D 64-Bit PCI Graphics
- 2.5GB 11ms EIDE Hard Drive
- 12X CD-ROM/3.5" Diskette Drives
- 16-Bit Gateway Sound
- Altec Lansing ACS-41 Speakers
- TelePath 33.6 Data/14.4 Fax Modem for Windows with Speakerphone
- **New Look Mini Tower Case**
- 104+ Keyboard & MS IntelliMouse™
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- 2MB SGRAM, 3-D 64-Bit PCI Graphics
- 2.5GB 11ms EIDE Hard Drive
- 12X CD-ROM/3.5" Diskette Drives
- 16-Bit Ensoniq® Wavetable Sound Card
- Altec Lansing ACS-41 Speakers
- TelePath 33.6 Data/14.4 Fax Modem for Windows with Speakerphone
- **New Look Mini Tower Case**
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
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G6-180 FAMILY PC

- Intel 180MHz Pentium Pro Processor
- 32MB EDO DRAM
- 256K Internal Cache
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- 2.5GB 11ms EIDE Hard Drive
- 12X CD-ROM/3.5" Diskette Drives
- 16-Bit Ensoniq Wavetable Sound Card
- Altec Lansing ACS-41 Speakers
- TelePath 33.6 Data/14.4 Fax Modem with Speakerphone
- **New Look Mini Tower Case**
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- MS Office 97, SBE Plus*
- Gateway Gold Service & Support for Desktop PCs
- **DISH Network Satellite System* Offer**

\$2449 As low as* \$85/mo.

G6-200 FAMILY PC

- Intel 200MHz Pentium Pro Processor
- 64MB EDO DRAM
- 256K Internal Cache
- CrystalScan700 .28dp Monitor (15.9" viewable area)
- STB® VIRGE™/VX 4MB, 3-D 64-Bit PCI Graphics
- 3.8GB 11ms EIDE Hard Drive
- 12X CD-ROM/3.5" Diskette Drives
- 16-Bit Ensoniq Wavetable Sound Card
- Altec Lansing ACS-41 Speakers
- TelePath 33.6 Data/14.4 Fax Modem with Speakerphone
- **New Look Mini Tower Case**
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- MS Office 97, SBE Plus*
- Gateway Gold Service & Support for Desktop PCs
- **DISH Network Satellite System* Offer**

\$2899 As low as* \$100/mo.

G6-200XL

- Intel 200MHz Pentium Pro Processor
- 64MB EDO DRAM
- 256K Internal Cache
- CrystalScan700 .28dp Monitor (15.9" viewable area)
- STB VIRGE/VX 8MB, 3-D 64-Bit PCI Graphics
- 5.1GB 10ms EIDE Hard Drive
- 12X CD-ROM/3.5" Diskette Drives
- CD-Recordable w/ SCSI Controller
- 16-Bit Ensoniq Wavetable Sound Card
- Altec ACS-410 & ACS-251 Speakers
- TelePath 33.6 Data/14.4 Fax Modem with Speakerphone
- **New Look Mini Tower Case**
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- MS Office 97, SBE Plus*
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- **DISH Network Satellite System* Offer**

\$3749 As low as* \$130/mo.

Performance Graph



Ziff-Davis' Winstone 97 Version 1.0 produced scores of 16.9 and 36.4; 18.2 and 38.0; 18.5 and 37.4; and 20.2 and 42.7 Winstone Version 1.0 units on its High-End Winstone 97 suite and Business Winstone 97 suite on Gateway 2000, Inc. PCs configured with 166MHz Intel Pentium Processor with MMX technology, 200MHz Intel Pentium Processor with MMX technology, 180MHz Intel Pentium Pro processor and 200MHz Intel Pentium Pro processor, respectively. All Gateway 2000 PCs tested featured 32MB RAM, 256K RAM cache, 3.8GB hard disk, IDE controller, FAT file system, and no hardware disk cache. Systems include S3 VIRGE/VX graphics adapter; with 4MB VRAM with v1.23m3 driver; 1024x768 with 256 colors; and a refresh rate of 75Hz. Test systems used MS DOS 7.1 and MS Windows 95. All products used in the test were shipping versions available to the general public, and the test and its results were not verified by Ziff Davis.

*MS Office 97, Small Business Edition Plus includes MS Word 97, Excel 97, Publisher 97, Automap Streets, Encarta® 96 and Outlook™ 97.

**MMX Technology-Enhanced Software Bundle includes Pod™, Eraser™ - Turn About, The Ultimate Human Body Version 2.0, and The Third Dimension™.



Professional Systems

P5-133

- Intel 133MHz Pentium Processor
- 16MB Synchronous DRAM
- 256K Pipelined Burst Cache
- CrystalScan500 .28dp Monitor (13.9" viewable area)
- 2MB SGRAM, 3-D 64-Bit PCI Graphics
- 1.2GB 11ms EIDE Hard Drive
- 12X CD-ROM/3.5" Diskette Drives
- Mini Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- MS Office 97, SBE Plus*
- Gateway Gold Service & Support for Desktop PCs

\$1499 Business Lease† \$55/mo.

P5-166

- Intel 166MHz Pentium Processor with MMX Technology
- 24MB Synchronous DRAM
- 256K Pipelined Burst Cache
- CrystalScan700 .28dp Monitor (15.9" viewable area)
- 2MB SGRAM, 3-D 64-Bit PCI Graphics
- 2.5GB 11ms EIDE Hard Drive
- 12X CD-ROM/3.5" Diskette Drives
- Mini Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- MS Office 97, SBE Plus*
- Gateway Gold Service & Support for Desktop PCs

\$1999 Business Lease† \$74/mo.

P5-200

- Intel 200MHz Pentium Processor with MMX Technology
- 32MB Synchronous DRAM
- 512K Pipelined Burst Cache
- CrystalScan700 .28dp Monitor (15.9" viewable area)
- 2MB SGRAM, 3-D 64-Bit PCI Graphics
- 2.5GB 11ms EIDE Hard Drive
- 12X CD-ROM/3.5" Diskette Drives
- Mini Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- MS Office 97, SBE Plus*
- Gateway Gold Service & Support for Desktop PCs

\$2299 Business Lease† \$85/mo.

G6-200

- Intel 200MHz Pentium Pro Processor
- 32MB EDO DRAM
- 256K Internal Cache
- Vivitron®700 .26dp Monitor (15.9" viewable area)
- STB VIRGE/VX 4MB, 3-D 64-Bit PCI Graphics
- 3.8GB 11ms EIDE Hard Drive
- 12X CD-ROM/3.5" Diskette Drives
- Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- MS Office 97, SBE Plus*
- Gateway Gold Service & Support for Desktop PCs

\$2599 Business Lease† \$96/mo.

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(Available to both existing and new Gateway customers.)

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Our Gateway Select program lets you know you're getting software that meets or exceeds our standards for quality, value and ease of use.

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- **Kid's BackPack™ III** Includes Schoolhouse Rock!™; Grammar Rock™; Sesame Street: Get Set to Learn®; Math Blaster® Episode 2: Secret of the Lost City; Imo & The King™; Putt-Putt® Goes To The Moon™; and Gateway cow-spotted backpack. **\$59**
- **Finance Pack II (U.S. Shipment Only)** Includes Quicken® Deluxe 6, Quicken Financial Planner™ 2, Quicken Family Lawyer™ 7, Quicken Parents' Guide to Money™ and a Turbo Tax® 96 coupon. **\$69**

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(Each printer includes cable and ink cartridge.)

- Canon® BJC®-240 Bubble Jet Printer **\$189**
- Canon BJC-70 Portable Bubble Jet Printer **\$299**
- Hewlett-Packard LaserJet 5L Xtra Laser Printer **\$399**
- Hewlett-Packard LaserJet 6P Laser Printer **\$769**
- MS® SideWinder™ 3D Pro Joystick **\$59**
- APC™ Back-UPS® 650 Pro UPS **\$329**
- Visioneer™ PaperPort Vx™ **\$249**

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GATEWAY™ component add-on sales at 800-846-2080.
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*On-site service is available to most locations in the continental United States, Alaska, Hawaii, Puerto Rico and Canada after you and your Gateway technician determine an on-site visit is necessary. On-site service is provided by PC Technology Services, Inc. On-site is not available for any monitor, mouse, keyboard, or portable system. Write or call for a free copy of the on-site service agreement.



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(Sold only with the purchase of a system.)

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- Altec™ Lansing ACS-251 Subwoofer **\$75**
- Altec Lansing ACS-410 Dolby® Surround Sound Speaker System w/ ACS-251 Subwoofer **\$120**
(upgrade from PCs that include Altec ACS-41 speakers)
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4X read/2X write recordable CD drive with SCSI controller, CD Creator 2 for MS Windows® and three media disks.
- Iomega® Ditto™ 3200 Internal Tape Backup Unit **\$199**
3200MB with compression, nominal 1600MB
- Iomega Internal Zip™ 100MB Drive **\$139**
(includes three 100MB cartridges)
- Iomega External Zip 100MB Drive **\$199**
(before \$50 manufacturers rebate)
- Iomega Jaz® 1GB Drive **\$429**
(includes SCSI controller and 1GB cartridge)
- MS Windows NT® 4.0 Upgrade **\$99**
(upgrade from PCs that include MS Windows 95)

Portable PC Upgrades

- Gateway Solo™ Mini Docking Bar **\$199**
- 28.8 PCMCIA Data/14.4 Fax Modem **\$200**
- Gateway Solo 2100 upgrade from an 11.3" Dual Scan to an 12.1" Active Matrix SVGA color display **\$530**

Destination™ Big Screen PC Upgrades

- harman/kardon® High-Fidelity Sound System
Seven-piece Dolby Pro Logic® Surround Sound speaker system including AVR-10 audio/video receiver with remote, subwoofer, center channel, and four satellites for the ultimate multimedia audio experience. **\$699**

The Dakota Keykeeper is
Gateway 2000 Security
Guard, Ed Redenius.
Thanks for freezing your
"key-ster" off for us during
this photo shoot, Ed.



MiniWeb, you can designate a page as the template for any new page you create in that MiniWeb. With a single command, you can save a MiniWeb and any sub-Webs to your hard disk or a Web server.

AOLpress 1.2.3 supports all HTML 3.2 and Netscape 3.0 features except frames, and it includes a spell-checker. Version 2.0, tested by PC Labs in a publicly available beta version, lets you create frames by dragging on the border of a window. If you understand the basics of Java programming, you can insert Java applets into your pages, but AOLpress will display the applets as empty boxes until AOL settles licensing issues concerning Java.

Both 16- and 32-bit copies of AOLpress 1.2.x and 2.0 are downloadable for free from www.aolpress.com. The 32-bit versions support long filenames but don't use Windows 95's native File | Open dialog, so you have to use AOLpress's relatively awkward menus to delete and manage files. In addition, the program won't show you a preview of graphics before you import them. And some of the package's Web publishing features work only with AOL's Web hosting services or with servers that use the free AOLserver software.

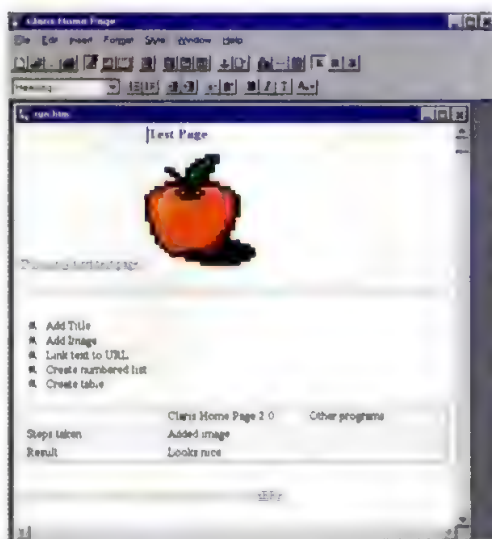
You owe it to yourself to try AOLpress—available free to anyone regardless of whether you're a member of AOL—before you spend money on any other Web authoring package. If you don't mind a slightly steep learning curve, you may find that this powerful package is the only HTML editor you'll ever need.—EM

AOLpress 1.2.3. List price: Free. America Online Inc., Vienna, VA; 703-448-8700; www.aolpress.com. Circle 478 on reader service card.

Claris Corp.

Claris Home Page

Though it doesn't offer the wizards and site-oriented tools of a product such as Microsoft FrontPage 97, Claris Home Page 2.0 (\$99 list) provides many advanced HTML 3.2 features, automated in the form of simple drop-down menus. The product is intended for begin-



Claris Home Page 2.0 has good graphics support and some powerful features, but certain tools may confuse beginners.

ners, but its presentation of HTML editing attributes is sometimes too technical. Version 2.0 lets you transfer files via FTP and edit HTML files on a Web server from within the program. It's still focused mainly on single pages rather than sites, though, lacking some more powerful features such as site mapping and link verification.

A main drawback is that Home Page assumes you know rudimentary Web terminology, instead of completely shielding you from HTML syntax. It uses technical HTML terms for most of its functions. For instance, for adding an anchor link, the Link Editor simply shows you that an anchor looks like this: #anchorName. You must be familiar with the concept of an anchor and know how to arrange the elements on your page. The documentation does a good job of explaining Web basics, but a new user may find the program somewhat daunting. Home Page may be better for experienced users who don't require extensive site management features.

The program looks and acts like a word processor, with two toolbars for formatting and other functions (which you can disable but not customize). Home Page offers a few templates to get new users started, but they aren't especially

useful. Tables, forms, and frames are relatively easy to create, and they provide some of the program's dynamic editing capabilities. As you change each feature's attributes, the WYSIWYG representation changes. The table creator is especially handy, letting you add any number of items to the table cells, including hyperlinks, graphics, and anchors. Also useful is the Document Statistics function, which estimates how long your pages will take to download over a modem, an important consideration for anyone developing Web pages.

Home Page's support for images is very good, making it easy to work with a multitude of them. You can use any bitmap file types; the program will convert them automatically to .GIF files. The package includes a healthy dose of clip art to get you started, and you can manipulate and customize your graphics, modifying their size or shape. The program also supports image map creations and transparent .GIF files, a welcome feature for those intimidated by the tools and the prices of more robust graphics programs.

Publishing your pages and files is somewhat confusing, though the documentation describes the process. Instead of using a menu item, you must select File | New and then select Site, while making sure you're in the directory containing the files you're uploading to the Web server. Home Page creates a file that contains the server location, the target directory, and your user information and password.—Karen J. Bannan

Claris Home Page 2.0. List price: \$99. Claris Corp., Santa Clara, CA; 800-325-2747, 408-727-8227; www.claris.com. Circle 479 on reader service card.

Corel Corp.

Corel Web Designer

As you would expect from Corel, the venerable graphics and desktop software publishing company, the standalone version of Corel Web Designer 1.2 (\$149 list) is a consummate design tool with a prodigious clip-art library. Though the version that we re-

SUITABILITY TO TASK		
Claris Home Page		
	Power	Ease
Simple page creation	Excellent	Fair
Complex page creation	Good	Fair
Publishing	Fair	Fair

World-Wide Word Processors

By Ben Z. Gottesman

Although the tools in our main roundup are expressly for authoring Web pages, many users will find ideal tools in the programs they've been using for years to create documents: word processors. Now each of the three major word processors—Corel WordPerfect 7, Lotus's Word Pro 97, and Microsoft Word 97—have tools for generating Web pages.

Word processors offer several advantages over HTML-specific authoring tools. Users are comfortable with word processors. Also, you may want to distribute a document in a variety of formats other than HTML: paper or e-mail, for example. Your word processor gives you a single tool to do it all. And word processors include rich text-editing tools, such as spelling and grammar checkers, auto-correction, and complex formatting.

There are downsides, though. Some Web concepts don't exist in word pro-

cessors or heading styles. Instead, the document exports as one long HTML page. Of course, some products in our main roundup don't provide features for site creation or document conversion either.

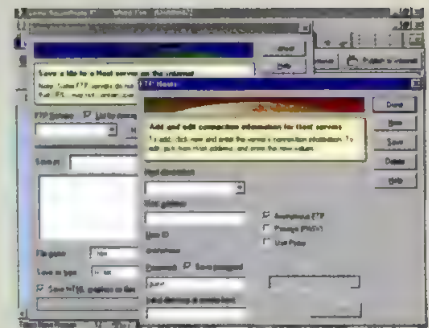
All of the word processors create a single HTML page from a native document. If you want to make your long documents more navigable when you export them to HTML, you should consider a third-party tool, such as InfoAccess's HTML Transit (\$495; 800-344-9737; www.infoaccess.com); Solutionsoft's WordToWeb (\$279; 888-765-6738; www.solutionsoft.com), which works only with Microsoft Word; or Net-It Software Corp.'s Net-It Now! (\$99; 888-638-4844; www.net-it.com), which converts any document created in a Windows 95 or Windows NT program into a Java-based Web page. These programs can intelligently divide a document into multiple pages based on paragraph styles, and they add appropriate navigation buttons to each page.

COREL WORDPERFECT 7

Corel WordPerfect 7—part of Corel Corp.'s WordPerfect Suite 7 and Office Professional 7 suite—has added Internet Publisher, which lets you create HTML documents or prepare existing ones for the Web. There's also an option for launching an external browser. And as we completed testing, Corel posted a beta of its new Internet Extension Package, which lets you surf the Web within the File Open dialog box (if you have Microsoft Internet Explorer 3.01) and open pages into WordPerfect.

WordPerfect's HTML conversion proved to be the weakest among the three programs. Many features that should be exportable from WordPerfect format to HTML, such as alternative numbering methods for ordered lists and some table borders, are not.

The program's Web Page Expert creates only one type of page—a generic home page—but it provides



Word Pro 97's publishing wizard walks you through uploading pages to the Web.

the best guidance of any of the page creation wizards in the word processors. WordPerfect changes many of its menus and icons to reflect only Web-appropriate formatting commands when you are editing Web pages. We found the program very easy to use.

Corel has also incorporated its Barista technology into WordPerfect. Barista converts WordPerfect documents to Java, keeping most formatting. But the search and navigation tools for documents published using Java aren't equal to those of Novell's Envoy 7 (included with the WordPerfect suites) or Adobe Acrobat. **Corel WordPerfect 7.** List price: Included with WordPerfect Suite 7, \$395. Corel Corp., Ottawa, Ontario, Canada; 800-772-6735, 613-728-3733; www.corel.com. Circle 480 on reader service card.

WORD PRO 97

We tested a late beta of Lotus Development Corp.'s Word Pro 97. The program, part of Lotus SmartSuite 97, should be available around the time you read this. To help users create Web pages, Word Pro provides nine attractive SmartMaster templates, which cover typical Web pages (from newsletters to catalogs) and even a home page for children. But unlike WordPerfect and Word, Word Pro does not disable options that can't be translated into HTML, such as parallel columns or footnotes. This can be

Continues

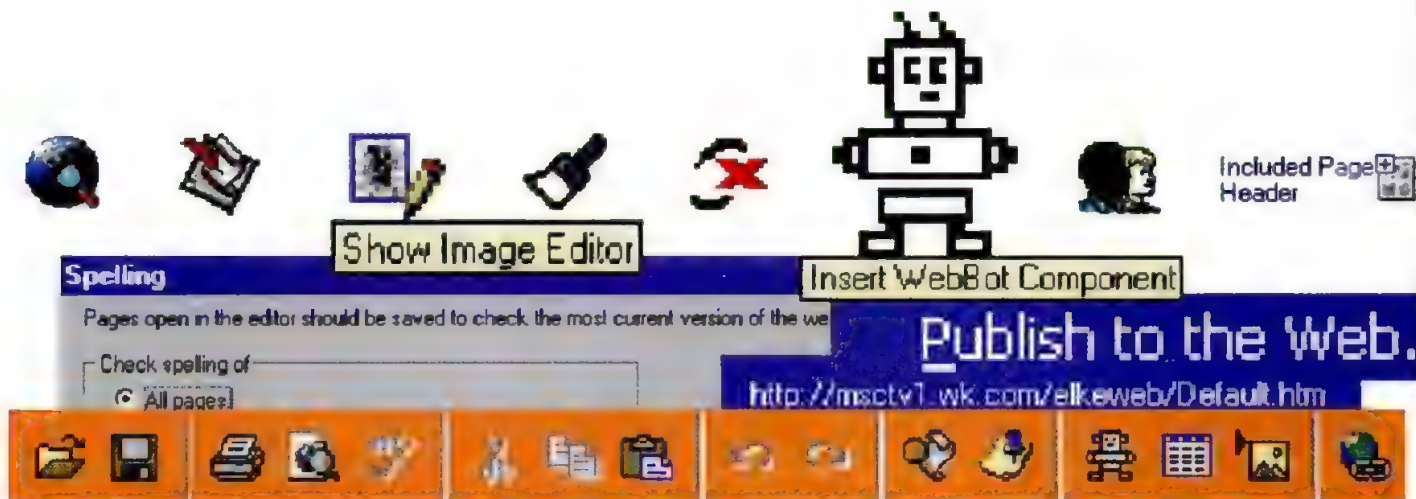


Corel WordPerfect's Web Page Expert prompts you for input and can create an entire Web of pages.

cessing: None of these programs support frames, for example. And because word processors don't use HTML as their native language, everything must go through a conversion process. Commonly you'll see that details like table borders and certain text enhancements do not translate properly. Also, none of these programs can break a long word processor document into multiple HTML pages based on user-specified criteria, such as chapter and section

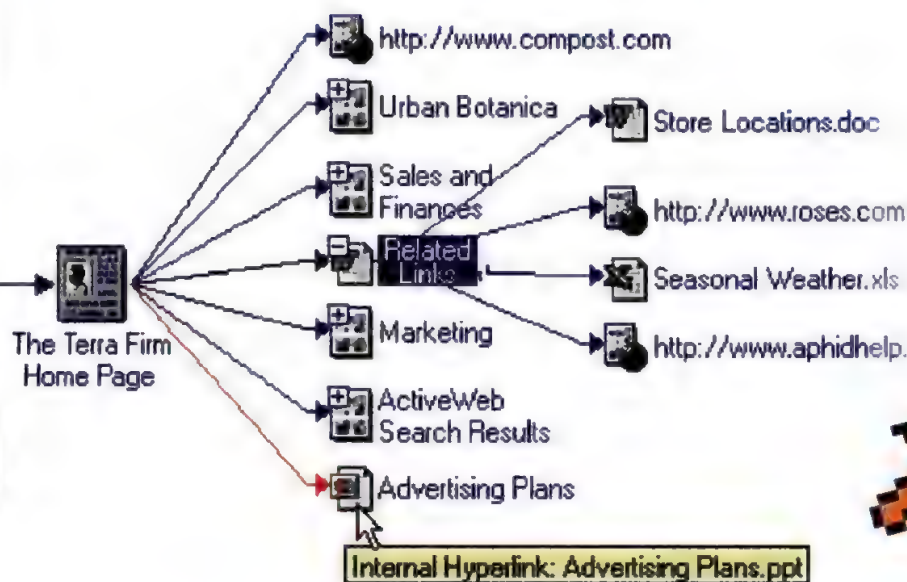
New Microsoft FrontPage 97

lets you
a really professional
even if you



create and manage -looking Web site

don't know what the hell you're doing.



Maybe you're not ready to wrassle computer gibberish to the ground and make it cry uncle. (Or **Uncle!**, as it more likely would say.) That's okay—the new **Microsoft® FrontPage™ 97** Web authoring and management tool has everything any Webmaster needs, and it lets you skip right to the fun stuff. For starters, you can use Web wizards to begin building your site. Create **instant hyperlinks**. Without a whit of programming know-how, call on **WebBot™ components** to add interactive features. Spell check across your entire site, instead of page by laborious page.

And check out that **Bonus Pack: Microsoft Internet Explorer 3.0**, **Microsoft Personal Web Server** and **Microsoft Image Composer** (a program packed with tools and free art). Want an even more dynamic site? Insert **Java™ applets**, **Netscape plug-ins** or **ActiveX™ controls**. You can even get in there and fiddle with the HTML code. And if there's an **intranet** in your future, the fact that **Microsoft Office** documents can be used as Web pages will help it right along. It's all doable, and you get to make co-workers call you "O Webmaster." Interest pliqued? Visit us online to find out more.

Microsoft®

Continued

confusing if you attempt to use such formatting options in a Web page.

The File menu's Internet option brings a variety of new choices, including a Web authoring toolbar you can use to insert hypertext links, preview pages, and publish them in HTML directly to a Web server. You can also enter a URL and browse the Web. Word Pro imports HTML reasonably well, and it inserts any tags it does not understand as comment notes.

Word Pro provides all the standard HTML form objects to create your own forms, but as with any other HTML editing tool, you'll have to do some server-side programming if you want to do anything with the data in the form. Lotus says that Word Pro 97 will support embedded Java applications, though that feature did not work in the beta version that we tested.

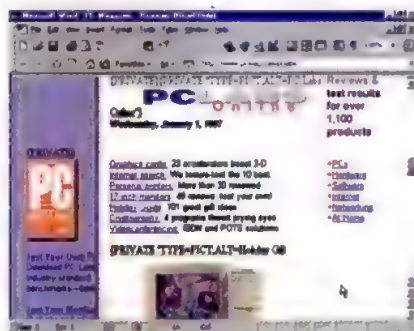
Word Pro 97. List price: \$105. Lotus Development Corp., Cambridge, MA; 800-343-5414, 617-577-8500; www.lotus.com. Circle 492 on reader service card.

MICROSOFT WORD 97

Microsoft introduced word processor-based HTML authoring with Word 95's Internet Assistant add-on.

viewed is unable to post the Web sites you create, the next revision, which should be available as part of the Corel WebMaster Suite by the time you read this, will let you publish pages on a remote server.

Web.Designer runs under Windows 3.x, Windows 95, or Windows NT, and ships with the AT&T WorldNet Service CD-ROM, which you can set up for Internet access. A hearty, refined application, Web.Designer offers support for Java scripts, client- and server-side image maps, embedded files, block quotations, and background sound, while offering a collection of more than 120



You can surf the Web directly within Microsoft Word 97 and edit imported HTML documents.

With Microsoft Word 97, part of the new Office 97 suite, the HTML authoring tools are built-in and feel much more integrated. As in the other programs here, you can open any Word document and export it to HTML with most formatting preserved or intelligently translated. Items such as hyperlinks and bookmarks are maintained. You can also use Word as a browser, so that you can very conveniently bring in existing HTML documents for editing. Word can also save to a Web or FTP server.

The program's Web Page Wizard lets you easily create a variety of pages, including personal home pages,

calendars, and forms. After you select a page, you can choose from eight style formats. Unlike WordPerfect's Web Page Expert, though, Word does not give you any guidance on replacing the sample content with real information. Users must select text and type over it.

Once you've told the program that you want to create an HTML page, Word changes all your menus to reflect choices appropriate for the Web. For instance, the Column and Drop Cap choices disappear from the Format menu, and Background Sound appears in the Insert menu.

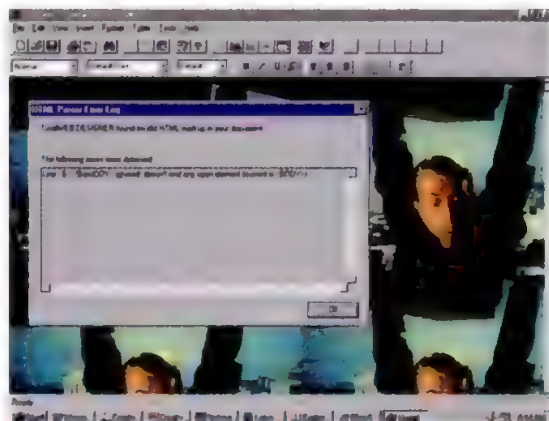
Word is the only word processor that lets you toggle between viewing an HTML document and its source code. The program does its best to display attributes written directly into the source code. HTML authors often use nested tables to get around HTML's lack of column support; they will love Word's new Table Drawing feature, a pencillike tool that lets you draw your cell borders and easily create uneven sets of rows and columns. **Microsoft Word 97.** Street price: \$340. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; www.microsoft.com. Circle 482 on reader service card.

ornate HTML templates. You can add links in your page to a myriad of different applications (FTP, Gopher, mailto, telnet, or Usenet), develop tables, insert lists, or use preformatted text. Corel even provides a varied assortment of fonts and an integrated spell-checker.

After beginning a Web site, experienced users can easily toggle between a graphical view of the page and an editing window containing the page's HTML code. Should you introduce an error when editing that code, Web.Designer identifies it when you toggle back to the WYSIWYG screen. The software also offers a Document Tree that shows a hierarchical map of the HTML used in your page. Web.Designer does not let you retrieve pages from ex-

isting Web sites; to do this, you need to copy pages using a third-party site management tool or Web browser.

Web.Designer comes with two supporting applications: Corel Web.Gallery and Corel Web.Transit. Web.Gallery is



If you introduce an unrecognized tag while editing HTML directly, Corel Web.Designer 1.2 identifies the error.

SUITABILITY TO TASK

Corel Web.Designer

	Power	Ease
Simple page creation	Excellent	Excellent
Complex page creation	Good	Excellent
Publishing	N/A	N/A

Now Fast in
Performance
ton!

PC Magazine - Feb. 4, 1997

Price/Perf

The \$3,399 Quantex QP5/200 SM-3, which earned this roundup's highest performance/features score, is an attractive choice for businesses. It offers much of the same hardware as Dell's Dimension and adds a 4.1GB Ultra SCSI hard disk, a subwoofer for its Altec speakers, and a telephony port. Among home PCs, the way P55C 2001



First in Technology, First in Value

Quantex is proud to be one of the first to offer systems with MMX™ technology. Thanks to this latest victory, the latest and greatest Intel processor can be yours today.

Boost Your Multimedia Performance to New Heights

Whether you're an Internet user, gaming addict or someone who requires the highest quality graphics and sound, MMX™ technology will give you the outstanding multimedia performance you need. MMX™ technology accelerates all these applications, giving you blazing speed in communications, high-quality stereo sound, 3-D realism and multimedia presentations. Data required for all multimedia applications can be processed faster, boosting speeds up to 60% on Intel's Media Benchmark.

At under \$ 2,500, We've Broken The Price Barrier

These new Quantex systems with MMX™ technology are packages of speed, power and performance. With quality components from some of the biggest names in the business, Quantex offers a value that can't be outdone. Buy a Quantex today and you'll be on the cutting edge of technology (and you'll save money too!). Turn the page for details.



Choose Quantex and Take The Technology Lead



Did You Know?



■ Quantex is recognized as a leader in performance and technology. Quantex has appeared on the cover of Computer Shopper 3 times in 1996! (April, August and December, 1996)

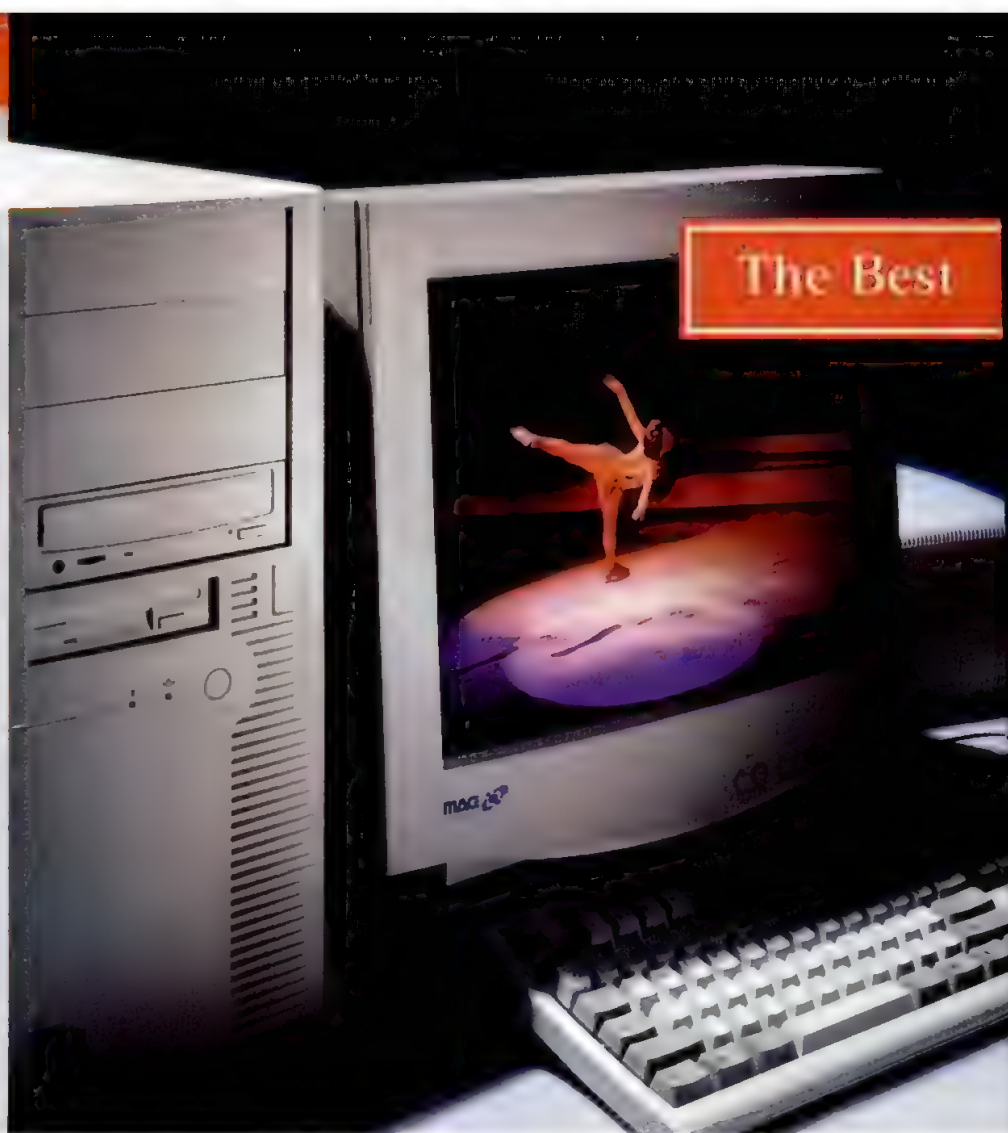
■ Quantex PC's consistently offer top-notch performance and usability. Quantex has received PC Computing's coveted ★★★★★ 4-star rating 3 years in a row (1994, 1995, 1996).

■ Quantex consistently offers industry recognized value and quality. Quantex has been on the Windows Magazine's Recommended List 39 times in 1996 alone!

■ Quantex consistently offers award-winning PC solutions. In 1995 and 1996, Quantex won 11 PC World Best Buy awards and has been on the PC World Top 20 List over 40 times.

■ Quantex provides the best PC's for the small/home office. Quantex was recently selected as Home PC Magazine's (Dec. '96) Lab Winner in the Home Office category.

"The (Quantex) QP5/200 SM-3, which earned this roundup's highest performance/features score, is an attractive choice for businesses."
PC Magazine, 2/4/97

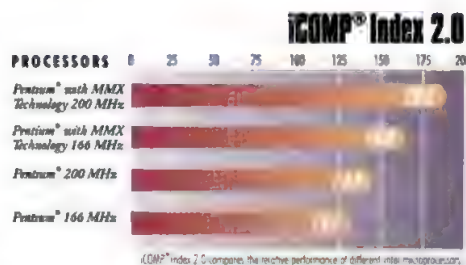


Combine MMX (tm) technology by Intel®, Matrox Millennium 3D graphics, and Toshiba's 12X CD-ROM drive, and you just can't get a better performing multimedia system. And you also get industry renowned quality brought to you by Quantex.

Systems Loaded With The Best and Brightest

We never compromise. Quantex systems are brimming with only top-performing components. Here's a sampling of this month's offering:

- **4GB Hard Drive** - THE largest EIDE hard drive available. Quantex brings you the largest EIDE hard drive and has put it in the fastest multimedia system available.
- **Toshiba's 12X CD-ROM** - Always on the cutting-edge, Quantex systems include Toshiba's 12X EIDE CD-ROM, the fastest CD-ROM drive available. You'll be impressed with its 125ms access time and 1800KB/s transfer rate.



Multimedia Performance



Power Multimedia Series

QP5/166 SM-1
(w/MMX™ Technology)

\$1899

Business
lease:
\$ 67/mo.

- 166MHz Pentium Processor w/MMX™ technology
- 32MB EDO Memory / 512KB Pipelined Burst Cache
- 2.5GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- Diamond Stealth 3D 2000 w/4MB EDO DRAM
- MAG 15" Digital Monitor (14.0" viewable)
- 33.6 Kbps Fax/Modem w/Voice Mail and Speakerphone
- Toshiba 12X 125ms EIDE CD-ROM Drive
(Upgrade to Panasonic PD Drive for \$179)
- Ensoniq VIVO-90 32-Bit Wavetable Synthesizer
- Altec Lansing ACS-90 Speakers
- Mid-Tower Case
- 104-Key Keyboard With MS PS/2 Mouse
- MS Windows '95 With MS Plus
- Quantex Software Bundle (Including Corel WordPerfect Suite)
- 3-year limited Warranty, 24-hr./7-day Technical Support

QP5/200 SM-1 (w/MMX™ Technology).....\$2099

QP6/200 SM-1 (w/Pentium Pro processor)...\$2149

QP5/166 SM-2
(w/MMX™ Technology)

\$2199

Business
lease:
\$ 77/mo.

- 166MHz Pentium Processor w/MMX™ technology
- 32MB EDO Memory / 512KB Pipelined Burst Cache
- 3.2GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- STB Velocity 3D w/ 4MB VRAM
- MAG 17" Digital Monitor (16.1" viewable)
- 33.6 Kbps Fax/Modem w/Voice Mail and Speakerphone
- Toshiba 12X 125ms EIDE CD-ROM Drive
(Upgrade to Panasonic PD Drive for \$179)
- Ensoniq VIVO-80 32-Bit Wavetable Synthesizer
- Altec Lansing ACS-45 Speakers w/subwoofer
- Mid-Tower Case
- 104-Key Keyboard With MS PS/2 Mouse
- MS Windows '95 With MS Plus
- Quantex Software Bundle (Including Corel WordPerfect Suite)
- 3-year limited Warranty, 24-hr./7-day Technical Support

QP5/200 SM-2 (w/MMX™ Technology).....\$2399

QP6/200 SM-2 (w/Pentium Pro processor)...\$2449

QP6/200 SM-4

\$2799

Business
lease:
\$ 98/month

- 200MHz Pentium Pro Processor
- 64MB EDO Memory / 256KB Internal L2 Cache
- 4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- Matrox Millennium 3D w/4MB VRAM
- MAG 17" Digital Monitor (16.1" viewable)
- 33.6 Kbps Fax/Modem w/Voice Mail and Speakerphone
- Toshiba 12X 125ms EIDE CD-ROM Drive
(Upgrade to Panasonic PD Drive for \$179)
- Ensoniq VIVO-90 32-Bit Wavetable Synthesizer
- Altec Lansing ACS-400 Speakers w/ACS-250 subwoofer
- ATX Case
- 104-Key Keyboard With MS PS/2 Mouse
- MS Windows '95 With MS Plus
- Quantex Software Bundle (Including Corel WordPerfect Suite)
- 3-year limited Warranty, 24-hr./7-day Technical Support

QP5/166 PRO SM-4 (w/MMX™ Technology).....\$2549

QP5/200 PRO SM-4 (w/MMX™ Technology).....\$2749

QP5/200 SM-3

\$2499

(with MMX™ Technology)

Business lease: \$ 88/month

- 200MHz Pentium Processor with MMX™ Technology
- 32MB EDO Memory / 512KB Pipelined Burst Cache*
(Upgrade to 32MB SDRAM for \$20)
- 4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
(Upgrade to Seagate Barracuda 4GB SCSI HD w/ Adaptec SCSI Controller for \$679)
- Matrox Millennium 3D w/4MB VRAM
- MAG 17" Digital Monitor (16.1" viewable)
(Special upgrade to MAG DX700T for \$99)
- 33.6 Kbps Fax/Modem w/Voice Mail and Speakerphone
(Add Motorola Terminal Adapter for \$189)
- Toshiba 12X 125ms EIDE CD-ROM Drive
(Upgrade to the Panasonic PD Drive for \$179)
- Ensoniq VIVO-90 32-Bit Wavetable Synthesizer
- Altec Lansing ACS-45 Speakers w/subwoofer
(Special upgrade to ACS-400 speakers with ACS-250 subwoofer for \$99)
- Mid-Tower Case
- 104-Key Keyboard With MS PS/2 Mouse
- MS Windows '95 With MS Plus
- Quantex Software Bundle (Including Corel WordPerfect Suite)
- 3-year limited Warranty, 24-hr./7-day Technical Support

QP5/166 SM-3 (w/MMX™ Technology).....\$2299

QP6/200 SM-3 (w/Pentium Pro processor)...\$2549

*Pentium Pro 200 includes 256KB Internal L2 Cache)

■ **Matrox Millennium graphics** - As the professional's choice, the Millennium provides an award-winning 64-bit 3D graphics engine and Windows RAM (VRAM) for maximum performance.

A Bundle That Tops Off The Value (over 20 Titles!)

By offering the #1 choice in office suites, Corel's® WordPerfect® Suite 7, as well as over a dozen additional titles, Quantex offers a deal that simply cannot be beat!

Become a Part of the Internet

With Epoch's Internet Service, you get 6MB of free space on the Web as well as pre-loaded web page templates. Don't just surf the net - become part of it.

Your Satisfaction Is Our #1 Priority

Quantex systems come backed by a 30-day, "no-questions-asked" money-back guarantee and toll-free technical support. A 3-year warranty ensures your Quantex system will be worry-free. Want more information? Visit us at www.quantex.com.

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SUMMARY OF FEATURES

Personal Web-Page Editors



■ YES ■ NO □ OPTIONAL

Products listed in alphabetical order

	AOLpress 1.2.3	Claris Home Page 2.0	Corel Web.Designer 1.2	HoTMetal PRO 3.0	Microsoft FrontPage 97	Microsoft Publisher 97	MyInternet-BusinessPage
List price	Free	\$99.00	\$149.00	\$159.00	\$149.00	\$79.95	\$119.95
General Features							
Compatible with:							
Microsoft Windows 3.x	■	■	■	■	■	■	■
Microsoft Windows 95	■	■	■	■	■	■	■
Microsoft Windows NT 4.0	■	■	■	■	■	■	■
Wizards/Templates	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
User can edit HTML source code	■	■	■	■	■	■	■
Validates HTML code	■	■	■	■	■	■	■
Allows user-defined tags/templates	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
User can define reusable sections of code	■	■	■	■	■	■	■
Right-mouse-click menus	■	■	■	■	■	■	■
Spell-checker	■	■	■	■	■	■	■
Tables/Forms	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Frames editor	■	■	■	■	■	■	■
Netscape Navigator extensions	■	■	■	■	■	■	■
Microsoft Internet Explorer extensions	■	■	■	■	■	■	■
Supports Java applets	■	■	■	■	■	■	■
Supports ActiveX controls	■	■	■	■	■	■	■
Can preview page in user-selected browser	■	■	■	■	■	■	■
User can import:							
HTML	■	■	■	■	■	■	■
Plain text	■	■	■	■	■	■	■
Microsoft Word documents	■	■	■	■	■	■	■
WordPerfect documents	■	■	■	■	■	■	■
Microsoft Excel tables	■	■	■	■	■	■	■
Lotus 1-2-3 tables	■	■	■	■	■	■	■
Technical support via e-mail	■	■	■	■	■	■	■
Technical support via toll-free number	■	□	■	■	■	■	■
Graphics							
Image editor	■	■	■	■	■	■	■
Supports .GIF/JPEG files	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
User can import .BMP/PCX files	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Client-side image map tool	■	■	■	■	■	■	■
Images and background samples included	1,000	1,000	7,500	1,500	740	5,000	1,360
Publishing							
Automatic link verification	■	■	■	■	■	■	■
User can retrieve pages from a Web site	■	■	■	■	■	■	■
Site mapping	■	■	■	■	■	■	■
Integrated FTP client	■	■	■	■	■	■	■*
Supports HTTP Put	■	■	■	■	■	■	■*
Includes Web-hosting service offer	■	■	■	■	■	■	■

* This product uses a proprietary file-transfer method for publishing Web pages.

a digital library that contains more than 7,500 unique graphics, including arrows, buttons, icons, photos, bullets, and clip art. Via OLE 2.0, Web.Gallery allows you to drag and drop graphics into Web.Designer and incorporate them into your Web site. Meanwhile, Web.Transit—a scaled-back version of InfoAccess's HTML Transit—translates Word, WordPerfect, Word Pro, and

.RTF documents into complex HTML pages. Web.Transit automatically generates hyperlinked tables of contents, splits files into multiple HTML pages, and inserts navigation buttons.

The forthcoming WebMaster Suite will include a copy of both Web.Gallery and Web.Transit, while augmenting Web.Designer with support for ActiveX controls, complete FTP functionality,

CGI scripts, and frames. Corel will include the option of one free month of Web server hosting from the Micro-Crafts hosting service, which charges \$14.95 for each additional month. Other features that Corel will bundle with this massive Web design package include a tool for managing your online site, a package for publishing database information on the Web, an image editor,

HoTMetaL PRO

You can drag graphics into the editing window from

You can turn off HotMetal PRO 3.0's tag icons and toolbars but not the user-unfriendly editing dialog boxes.

HoTMetal PRO 3.0. List price: \$159.

SoftQuad Inc.,
Toronto, Ontario,
Canada; 800-387-
2777, 416-239-4801;
www.softquad.com.
*Circle 485 on reader
service card.*

SUITABILITY TO TASK		
	Power	Ease
Simple page creation	Good	Fair
Complex page creation	Good	Fair
Publishing	N/A	N/A

Corel Web.Designer 1.2. List price: \$149. Corel Corp., Ottawa, Ontario, Canada; 800-772-6735, 613-728-8200; www.corel.com. *Circle 480 on reader service card.*

Microsoft Corp.

Microsoft FrontPage 97



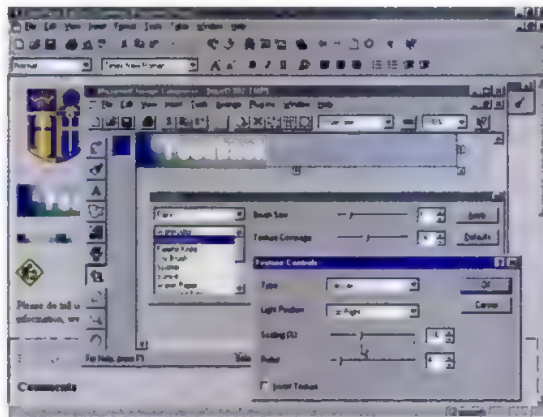
Microsoft FrontPage 97 (\$149 list) surpasses all rivals in its ability to create complex, interactive Web sites with just a few mouse clicks. Microsoft's combination HTML editor and Web site manager uses a wizard interface to build sites so tightly integrated that you can change the text and graphic banner on top of one page and let the program propagate the change throughout your site. Less expensive programs (such as the free AOLpress) are equally adept at creating visually complex Web sites, but no other program lets you create a Web site with the same depth of automation, consistency, and convenience as FrontPage.

Even if you know nothing about HTML syntax or CGI scripts, you can use FrontPage's WebBot feature to implement such advanced functions as forms processing, discussion groups, and dynamically created Web pages. FrontPage is less helpful when you want to break out of its structure, but its minor inconveniences are outweighed by its automation and elegance.

FrontPage 97 consists of three main applications: FrontPage Explorer, which lets you manage the elements on your Web site; the FrontPage Editor, which lets you create HTML pages; and a unique desktop Web server, which lets you build and test your site with real HTTP links (though FrontPage also allows you to save HTML pages as files to your hard disk). After the program's wizard creates a set of pages with the style and structure you choose, the FrontPage Explorer window displays a tree-structured view of your entire Web site, with all links and graphics. From Explorer, you can spell-check all documents on your Web site and verify the site's links. When you click on one of the icons in this window, the corresponding page opens in the FrontPage Editor, which

looks and acts like Microsoft Word.

The FrontPage Editor lets you import any word processing document or HTML file. An optional window lets you modify the raw HTML code of the current page. You can import graphics in virtually any format, and the Editor automatically con-



Microsoft FrontPage 97 includes Image Composer, an application specifically for editing Web graphics.

verts them to .GIF or JPEG files. A toolbar lets you create client-side image maps very easily by drawing shapes on a graphic. The included Microsoft Image Composer can create sprites with advanced animated effects.

FrontPage creates tables and forms effortlessly. As soon as you insert any form

element on a page, the program builds a form around it. The program can create frames, but it displays only the skeleton of the frames, not

the content of the frames as they will appear in a browser. FrontPage compiles a list of unfinished tasks required to complete your Web site, and it opens the pages that need work as soon as you click on a task.

When you publish your Web site, FrontPage determines whether you're publishing to a server that uses FrontPage extensions; if not, the program launches the included Web Publishing Wizard. FrontPage even lets you upload only changed files to your site. To use some of the server-side WebBots—such as the discussion-forum WebBot—the Web server you're posting

to must have the FrontPage extensions installed.—EM

Microsoft FrontPage 97. List price: \$149. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; www.microsoft.com. Circle 482 on reader service card.

Microsoft Corp.

Microsoft Publisher 97

If you're willing to let Microsoft Publisher 97's wizards design your Web site, you'll be rewarded with impressive-looking pages rich in stylish graphics and up-to-date design. You can create your own designs instead with this \$79.95 desktop publishing package, but combining them into a full Web site is more difficult than with a dedicated HTML editor.

Publisher 97 is still paper-based at heart, and Microsoft does not position it as a product focused on producing HTML pages. It organizes documents according to sequential page and image numbers, unlike Web-based applications, which organize pages and images by name. Publisher 97 can create dazzling overlapping graphics and complex tables, but it doesn't include some HTML-specific layout features, such as frames and forms. Still, it's a good package for Internet publishing: Unlike some of the other Web editors we reviewed, it includes a wizard that automates the uploading of your site to an online service or to a Web server via FTP.

Only when it saves a site to your disk or posts it to the Web does Publisher 97 generate HTML code; it doesn't let you edit the code directly. Also, the pages it generates make heavy use of image maps and other graphical features. Publisher 97 outputs even ordinary tables as graphics, not as HTML tables with text you can modify manually in a text editor. Webmasters will prefer programs that create more easily modifiable HTML

code, but Publisher 97's intended audience—small-office and home users—will be delighted to be able to create professional-looking

Web pages with a minimum of effort.

Everything in the program is designed for beginners. Pop-up tips appear whenever you attempt a task for the first time,

SUITABILITY TO TASK

Microsoft FrontPage 97

	Power	Ease
Simple page creation	Excellent	Excellent
Complex page creation	Excellent	Excellent
Publishing	Good	Good

SUITABILITY TO TASK

Microsoft Publisher 97

	Power	Ease
Simple page creation	Good	Excellent
Complex page creation	Fair	Good
Publishing	Fair	Good

AN UNKNOWN ENGINEER. A TWO-HEAD COLOR PRINTER YOU'VE NEVER HEARD OF. AND 10 REASONS WHY YOU SHOULD CARE.

#1 Two heads are better than one. (But your mother probably already told you that.)

#2 You're tired of your black inks getting wet and running into Rorschach test patterns.

#3 You're sick of your kids whining how Jimmy's dad prints out cooler T-shirts than you do.

#4 You don't think a color inkjet printer should cost as much as a military-issue hammer.

#5 You really don't care if your inkjet printer comes from a company that builds multi-million dollar supercomputers to solve deep problems in pure mathematics.

#6 Engineering types are all pretty much faceless guys to you anyway.

#7 You're tired of calling the psychic hotlines to find out how much ink is left in your print cartridges.

#8 You're tired of switching color and black ink cartridges in and out, in and out, in and out, in and out, in and out, in and out...

#9 You're comfortable with the idea of grown men wearing paper bags on their heads.

#10 OK. You don't really care about our unknown engineer. But for printing vivid colors and true black on the same page at the same time – without constantly swapping ink heads in-and-out – you'll want our two-head Lexmark® 2030 Color Jetprinter.™ It uses water-resistant black ink that won't run. And it comes loaded with software that lets you print everything from greeting cards to T-shirts. In stores now for just \$199.*



We may be unknown to you because we've been making printers exclusively for business and have just now started to make high-quality printers for people to use at home.



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www.lexmark.com

COVER STORY

Personal Web-Page Editors

and special context-sensitive mouse cursors have labels to indicate what will happen to a selection, such as Move and Copy. All functions are accessible from clear toolbars and menus. But you can view only one page (or one double-page spread of printed text) at a time.

The site-building wizard lets you choose among designs in five styles for business, community, or personal use, each with up to eight sample pages linked to the home page. You can choose whether links will use text, graphics, or both. The wizard can add an e-mail link to your pages as well, but you cannot add FTP or other Internet links. When the wizard is done, you replace the dummy text with your own. The wizard also automatically inserts a graphic promoting Microsoft Internet Explorer on your home page, an annoying feature we couldn't disable.

If you double-click on a supplied graphic, Microsoft's clip-art gallery pops up and lets you replace it with any of the CD-ROM's 5,000 images. Microsoft supplies more than 1,000 additional graphics for Publisher users at the company's Web site. You can import any graphics in standard bitmap or vector format, and when Publisher exports your site in HTML format, it automatically converts all graphics to .GIF files.

If you want to add hyperlinks in addition to the ones created by the wizard, you can specify the filename of any HTML page on your hard disk. To link to another page within the same Publisher 97 site, you must identify it by its page number. Although you can't follow hypertext links to Web pages from within Publisher, you

can preview them in your default browser.—EM

Microsoft Publisher 97. List price: \$79.95. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; www.microsoft.com. Circle 482 on reader service card.

MySoftware Company

MyInternetBusinessPage

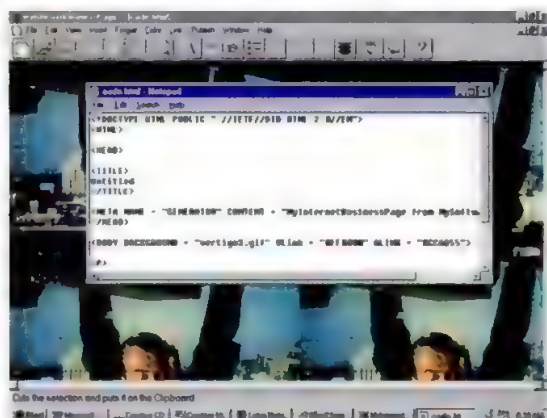
Designed for business users who quickly need to create and upload a Web page, MySoftware Company's MyInternetBusinessPage (\$119.95) is an insufficient HTML editor. This application does not support tables, frames, embedded files, or any HTML 3.2 tags. MyInternetBusinessPage does enable you to upload your home page to a Web server instantaneously, but you can post your page only to SwiftSite, a Web server hosting service that is a partner of MySoftware Company.

MyInternetBusinessPage—also referred to as MyBusinessPage—includes EarthLink Network's TotalAccess Internet with Netscape Navigator, but you can use the product with any standard TCP/IP stack and browser. Without the EarthLink portion, MyBusinessPage installs within 5 minutes under Windows 3.x or Windows 95. It also requires only 8MB of hard disk space. With MySoftware's exhaustive documentation on paper and its extensive library of business-oriented HTML templates on hard disk, even Internet neophytes can begin designing Web sites immediately.

The resulting sites, though, end up as relatively bland creations. Apart from its use of Netscape forms, bulleted lists, and horizontal rules, MyBusinessPage supports little more than commonplace graphics and bald (but colorful) text. It features only two font options—monospace and the aptly named plain—and does not allow for preformatted text, tabular formatting, audio, or video. You do have access to a 1,300-piece collection of graph-

ics, buttons, and logos, but MyBusinessPage does not allow you to convert word processing files into HTML.

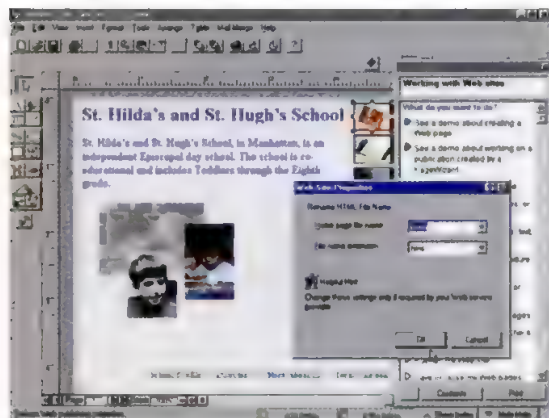
With this package, capability takes a back seat to usability. The editor displays your page almost exactly as it would appear on the World Wide Web and automatically gathers all requisite files in a common directory. You must launch your browser to check hypertext links or retrieve pages from the Web, but you never have to come in contact with unsightly HTML codes—unless you happen to be editing a page created with another tool containing tags that MyBusinessPage



MyInternetBusinessPage lets you easily create basic HTML, but it's not as full-featured as the other products here.

doesn't recognize. If you prefer using HTML or wish to incorporate more advanced features into your page, the product can launch Notepad to let you view and edit the raw source code.

MyBusinessPage's defining characteristic comes into play only after your editing is complete: Integrated publishing software from SwiftSite will post your newly created home page on the Web for a free 12-hour trial period. You can then publish on a more permanent basis via one of three monthly plans, starting with the \$14.95 basic plan. This plan allows up to 2MB of files, submits your site URL to three major search engines, and allows up to 250 visits per day. The \$34.95 deluxe plan offers you 30MB of space, your own



Microsoft Publisher 97's dialog boxes include helpful tips to prevent errors when you have a choice of actions.

SUITABILITY TO TASK

MyInternetBusinessPage

	Power	Ease
Simple page creation	Fair	Good
Complex page creation	Poor	Poor
Publishing	Poor	Excellent

Award Winning Products



November 1996
Boot Magazine
RE: Nimantics Orion 6X



October 1996
Byte Magazine
RE: Nimantics Quanta 6X



December 1996
Boot Magazine
RE: Nimantics NX-Ultra 133



January 1997
Boot Magazine
RE: Nimantics Orion 6X 200



November 1996
Laptop Buyers Guide
RE: Nimantics NX-Ultra 133

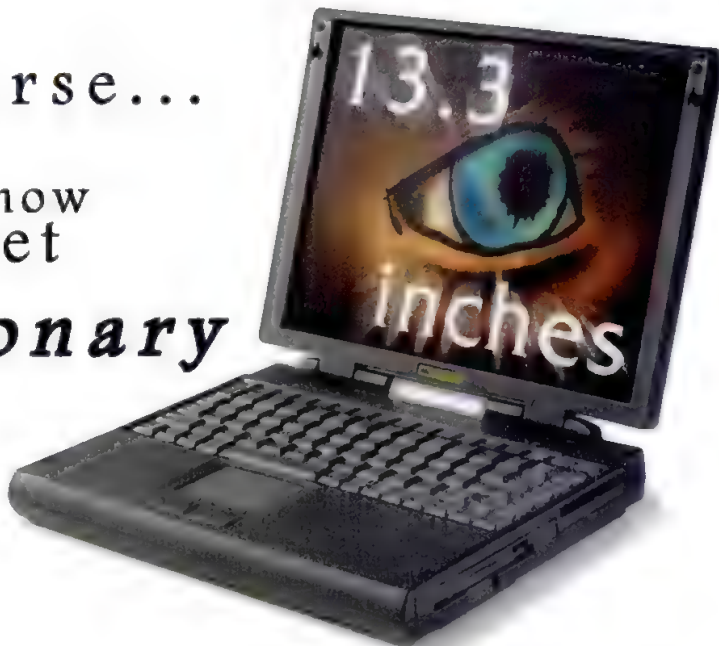


December 1996
Boot Magazine
RE: Nimantics Orion 186



You've
Seen
our
Workhorse...

now
Meet
the
Visionary



Our Workhorse:

The Nimantics
Orion 8X-200

Your Powerhouse, the
Award Winner; described as
"Racehorse", "Awesome",
"Reliable", and "Fastest"
by those who know.
Offering 200MHz Power,
the speed of EDO RAM,
pipeline burst cache,
and hardware MPEG.

The Visionary:

The Nimantics
Orion Ultra.

Your Dream,
Your Vision; suddenly
crystal clear, displayed
vibrantly across 13.3 inches
of XGA real estate, fueled
by 200MHz power and
long lithium ion
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MyInternetBusinessPage. List price: \$119.95. MySoftware Company, Menlo Park, CA; 800-622-2788, 415-473-3600; www.mybusinesspage.com. Circle 483 on reader service card.

Netscape Communications Corp.

Netscape Composer

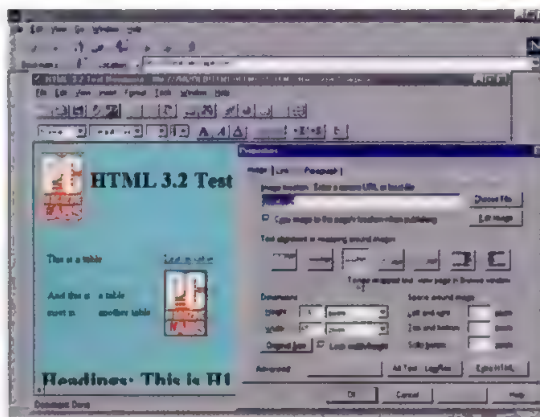
Netscape Composer, the HTML editing module in Netscape Communicator (\$49 list), is an improved, streamlined version of the HTML editor in Netscape Navigator Gold 3.0. Composer is clearly intended to create individual pages; it doesn't pretend to be a full-scale HTML editor and doesn't automate the creation of Web sites. Its simple but effective publishing feature can upload pages and files to a remote site via FTP or HTTP Put protocols. We tested the public beta version for this review; the shipping version should be available by the end of March.

Composer provides in-depth support for basic HTML features, such as links, images, and tables, but it can't create more complex elements, such as forms or frames. The editing screen resembles Navigator's browsing window, with a similar menu structure and two toolbars, one for major HTML features (such as links, graphics, and tables) and the other for character and paragraph formatting.

Composer's dialog boxes assume you know nothing about HTML. For example, when you insert an image, the program doesn't ask you to select an HTML alignment option by name; instead, it lets you choose among thumbnail diagrams that show how each alignment wraps the text. Inserting and editing tables and paragraphs are just as clear. A menu option lets you use Windows Notepad or an-

other text editor to edit the current page's HTML code, and Composer offers to update the changes in its visual-editing window when you exit the text editor.

Tight integration with the rest of Netscape Communicator gives Composer many advantages. To link your page to



Dialog boxes in Netscape Composer include helpful information and diagrams, not technical HTML terms.

another one, you just open the remote page in the browser and drag the icon that is next to Navigator's address window into Composer. You can also drag images from the browser into your page. Communicator's Messenger and Collabra modules let you send text formatted in

HTML as an e-mail or newsgroup message, and you can create and send it from Composer.

Composer does not come with any templates or graphics, but a menu item leads your browser to a page on Netscape's Web site that provides them. You can download sample pages and modify them in the editor window, or you can use a hand-holding wizard that prompts you to enter headlines and text and choose among a variety of supplied backgrounds, bullets, and horizontal rules. You open the resulting page in Composer to make additional changes.

Composer is an easy-to-use HTML editor, but just like Navigator and every other browser, it's designed to work with single pages, not to manage sites. If you

already use Navigator and need to create a few HTML pages, Composer will get the job done easily and quickly.—EM

Netscape Composer. List price: Included with Netscape Communicator, \$49. Netscape Communications Corp., Mountain View, CA; 415-937-3777 (individuals), 415-937-2555 (businesses); www.netscape.com. Circle 484 on reader service card.

MicroVision Development Inc.

WebExpress

MicroVision Development's WebExpress 2.0 (\$69.95 list) is a compact Web-page editor that is elegantly and smoothly designed but offers a relatively limited feature set. For instance, it doesn't include any publishing tools. The package creates Web sites as well as separate pages, using an editing window that looks and acts like a word processor—which is not surprising, as MicroVision also makes a basic word processor, WordExpress.

Beginners will be able to create basic pages, with links, graphics, and tables, but advanced features like forms require some expertise in how forms work. We tested a late beta version of 2.0; the shipping version, due by the time you read this, will include sample pages and graphics for you to use as the basis for your own pages.

When you create a new Web site in WebExpress, the program builds a barebones main page with links to two other pages, which it also creates. You can expand the Web site by inserting a link on any of your pages. If the target page doesn't exist yet, the program offers to create it for you. A Web site diagram displays these pages in a hierarchical list that can expand to show the links and

graphics on each page. You can store links and e-mail addresses in a permanent list to be reused, but WebExpress can open only

pages stored on your hard disk or network, not those on remote Internet sites.

In WebExpress, you apply formatting to pages by selecting a heading level from a drop-down list in a toolbar or by selecting standard paragraph and character for-

SUITABILITY TO TASK

Netscape Composer

	Power	Ease
Simple page creation	Good	Excellent
Complex page creation	Fair	Good
Publishing	Good	Excellent

SUITABILITY TO TASK

WebExpress

	Power	Ease
Simple page creation	Good	Good
Complex page creation	Excellent	Fair
Publishing	N/A	N/A



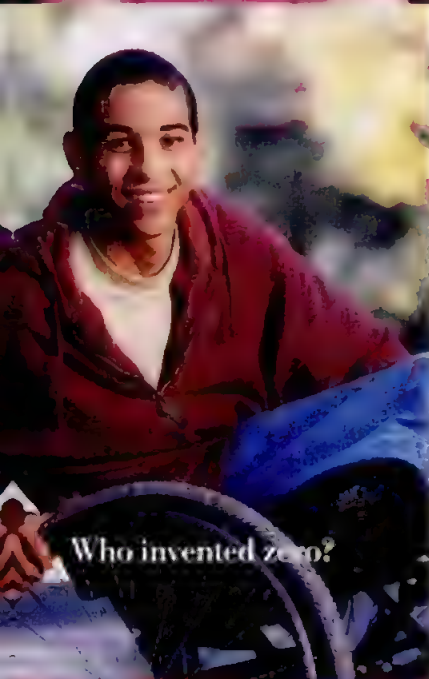
Who was the first horse?



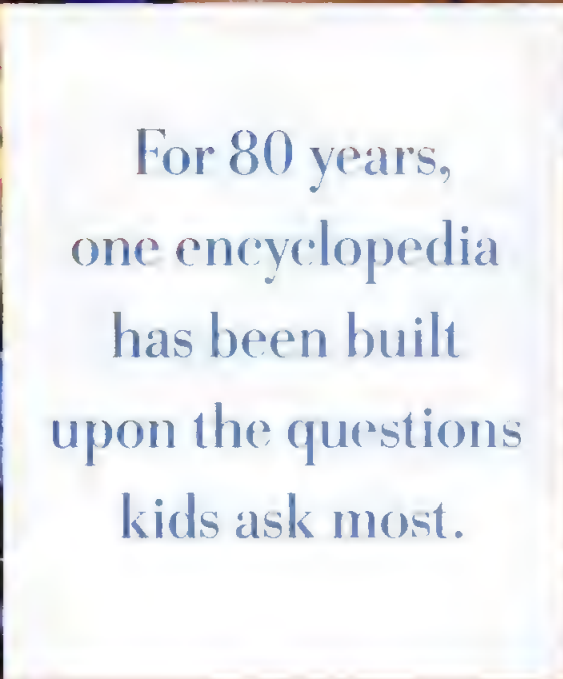
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Who invented zero?



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Why is Mars red?



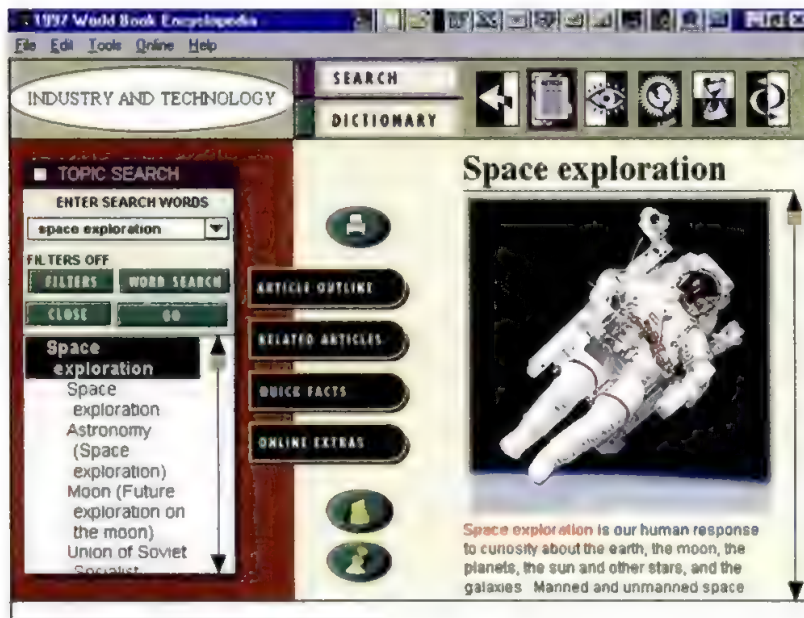
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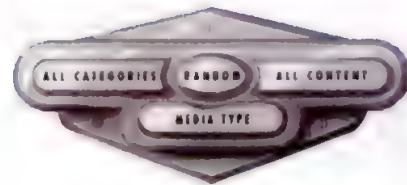
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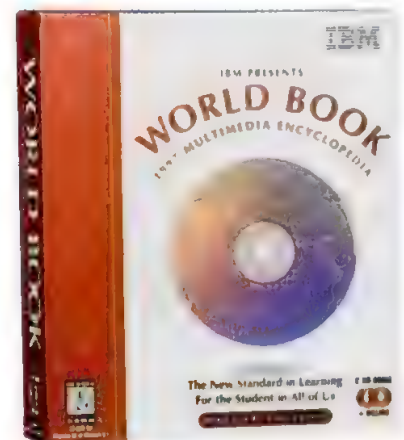


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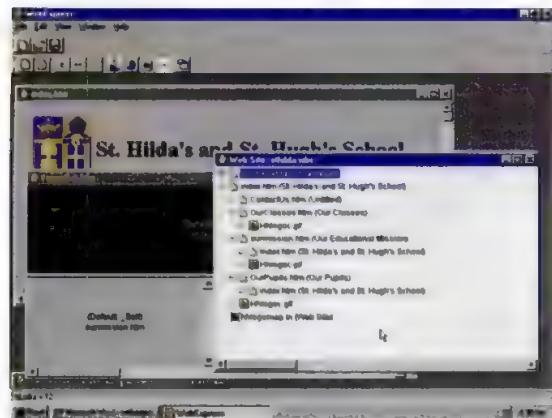


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mats from icons. Though you can create bulleted and numbered lists from the toolbar, WebExpress includes no keyboard shortcuts for one-step formatting of headlines and other text. To insert .GIF or JPEG graphics, you use a dialog box that optionally displays thumbnails of the files you want to insert. You can't drag and drop graphics onto the page, though you



The compact WebExpress 2.0 provides windows for editing pages, organizing frames, and displaying your Web site.

can open HTML files to edit by dropping them into the editing screen. Menu commands let you resize and join table cells, but the program doesn't include a button on the toolbar to create or edit tables.

The product does not include a separate image editor. You can create image maps, but only by manually typing in the coordinates of the shapes that will act as hyperlinks instead of defining the shape by clicking on the image itself. A form toolbar lets you add form elements but won't give you any help with complex form syntax.

WebExpress lets you create frames, but the current version can't display the contents of individual frames in the same window in which you define the frames' dimensions. Also, the program can't display raw HTML code, though you can use special dialog boxes to insert custom HTML tags or custom extensions to standard tags. Other special dialog boxes let you insert ActiveX and Java scripts, or create a list of specific fonts that Netscape Navigator and Microsoft Internet Explorer can use when displaying text.

WebExpress 2.0. List price: \$69.95. Micro-Vision Development Inc., Carlsbad, CA; 800-998-4555, 619-438-0305; www.mvd.com. Circle 486 on reader service card.

Thunder & Lightning Co.

Web Factory Author

Thunder & Lightning Co.'s Web Factory Author 3.0 (\$39 list) is an impressive Web editor that provides comprehensive tools for Webmasters. In addition, Web Factory Author (which is available for Windows 95 or Windows NT) allows even the most casual computer users to build their own sites with little effort. The program includes just an FTP utility for publishing, however, with no image editor. For more professional, site-oriented features, you'll want to consider Thunder & Lightning's full suite of Web tools, Web Factory Pro Image (\$199). It includes Web Factory Author, a site management tool for checking links, and a graphics editing and conversion tool.

Web Factory Author's strongest feature is its dynamic visual-editing interface, which splits the

screen into an HTML editor and a preview window. You can simultaneously edit and view your page in either the WYSIWYG

view or the HTML code window, with no need to launch an additional browser. When you make a change in the visual portion of the screen, the HTML code automatically reflects it (and vice versa). You can also customize the toolbar, making access to frequently used features more convenient. Web Factory Author supports HTML 3.2 as well as Netscape Navigator and Internet Explorer 3.0 extensions.

For HTML neophytes, Web Factory Author includes numerous templates that are instructional and easy to follow. When you first launch the program, you can either jump right in, view an HTML tutorial, or import an existing Web page. The templates are well documented, enabling you to create a page within minutes of start-

ing the program. Linking to existing pages and creating internal anchors is automated, so you can build an entire site quickly.

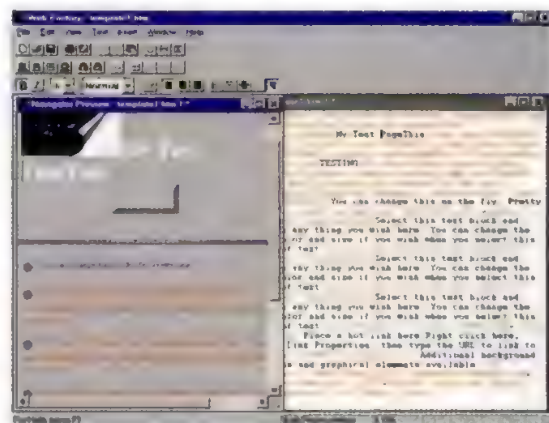
You can import sites into Web Factory Author for editing, though you can't browse pages from within the editor as you can with Microsoft FrontPage 97. Also, the program can't validate links, so you'll need a site management program (such as the one in Web Factory Pro Image) for that feature. Web Factory Author handles file path translations with ease, so you'll be able to modify your links from within the program and maintain their integrity via its Path Translation List. You can import most major image file types, and the program includes a spell-checker.

Power users will appreciate the support for Java, VBScript, and ActiveX, in addition to tools for client-side image maps, frames, and form creation. The frame editor is just one example of the program's powerful yet streamlined functionality: You simply click and drag the dimensions of the frames that you want.

Web Factory Author also provides rudimentary multimedia support for in-line movies and sound files. And you can now access all the program's advanced options via single-click buttons.—KJB □

Web Factory Author 3.0. List price: \$39. Thunder & Lightning Co., San Diego; 888-826-3520, 619-643-5550; www.tlco.com. Circle 487 on reader service card.

	SUITABILITY TO TASK	
	Power	Ease
Simple page creation	Excellent	Good
Complex page creation	Good	Good
Publishing	Fair	Good



Web Factory Author 3.0 shows both WYSIWYG and HTML code views. Your changes in one appear in the other as you type.



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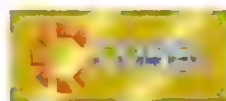
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Web Graphics Tools



On the Web, less is more. Here are the tools you need for tweaking graphics to fit the limited palettes and bandwidths imposed by the Internet.

Until the Web came along, the PC was progressing nicely as a graphics platform. Then suddenly, we all took a giant step backward. Instead of true 24-bit color, we're stuck with the 256-color palettes of yesterday. Instead of the big, rich images we can deliver across fast LANs and off CD-ROMs, we need tiny, slimmed-down graphics

By Thomas Mace

to fit the narrow pipes of dial-up users.

If you're a Web designer, these limitations won't earn you much sympathy from your audience. Web users expect slick, rich-looking graphics, and they're not patient about waiting for them to download.

Your only hope—other than good design sense—

A Palette Optimizers

These tools let you optimize limited color palettes while trimming down image sizes. Some of them offer rich image editing and batch processing.

B GIF Animators

GIF animations provide a remarkably flexible way to punch up pages. While some just give you the basics, others offer image editing, transitions, and morphing.

C Image-Map Editors

These tools add hyperlinked hot spots to Web graphics. The best let you create hot spots in any shape, generate HTML pages, and test the results on-line.

D Anti-Aliasing Tools

Shrinking a bitmap makes it faster to download but also seriously degrades image quality. Anti-aliasing and smoothing filters can help you compensate.



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is a grab bag of utilities for slimming down, modifying, tweaking, and optimizing Web graphics to make them look as good as possible in the smallest number of bytes.

This roundup offers a look at 17 such utilities. None will replace your primary image-creation and editing packages, but all can take existing graphics and apply a variety of optimizations. We review them under three broad categories: image-map editors, GIF animators, and palette optimizers (including anti-aliasing tools). As noted in the reviews, many provide features that fall into more than one category.

Image-map editors are the tools used for building Web images with areas that map to hyperlinks. Features to look for include a variety of shape tools for defining hot-spot areas, the ability to draw complex or free-form hot spots, zoom capability for precisely matching a hot spot with a particular area, and HTML generation so that it's easy to add the image map to a page.

GIF animation represents an extremely versatile, standards-based approach to adding motion to Web pages, tying images together to create a cartoonlike animation. The six utilities covered here offer a wide range of functionality from just-the-basics to professional-level capabilities including significant image-manipulation features.

Given the Web's severe color limitations, *palette optimization tools* may be the single most important category for professional Web designers. GIF, the Web's most widely used graphics standard, is an 8-bit (256-color) format, but designers prefer to use 7-bit or even lower color depths in the interest of creating small images.

A good palette optimization tool should be able to adapt a small palette to an existing image, let you create custom palettes, and then apply them to groups of files automatically. Doing this successfully may mean using several tools in tandem. Utilities that apply anti-aliasing or smoothing algorithms to images that have been scaled down can help preserve image quality, particularly where type is involved.

Much of this work involves trial and error, but the reviews that follow will help you get started with the right tools.

IMAGE-MAP EDITORS

Sausage Software

CrossEye

CrossEye 1.0 (\$25), part of Sausage Software's collection of easy-to-use Web design tools, is good for fast map creation but doesn't provide the tools for detailed or irregularly shaped hot spots. Some users also may find its cartoony interface and constant sound bytes to be excessive and unnecessary.

CrossEye gives you the standard rectangle-, circle-, and polygon-outlining tools for defining your hot spots, as well as a Cutlass tool for selecting and editing. You can assign URL and Target information to each area. The Infront and Behind buttons let you determine hierarchy for overlapped hot spots.

CrossEye can create NCSA (.MAP), CERN, or client-side maps, but you'll need to use it in

conjunction with an HTML editor. When you are finished editing, you simply click the Compile button, which copies the HTML code to the Windows Clipboard. From there, you can easily paste it into any existing HTML file.—*Andrew Boscardin*
CrossEye 1.0. List price: \$25. Sausage Software, Doncaster, Australia; 011-613-985-9888; www.sausage.com. *Circle 441 on reader service card.*

Mediatech Inc.

LiveImage

From the creator of Map This, a free-ware image-map editor reviewed below, comes LiveImage 1.0, a solid, full-featured image-map-creation tool. The program retains all of the features of its predecessor, with some noticeable improvements.

LiveImage (\$29.95), from Mediatech, has an assortment of wizards for all aspects of your project, including selecting and creating your images and publishing the final HTML page. In addition to importing GIF or JPEG graphics files, LiveImage lets you create your own graphic inside the editor.

The interface provides a two-frame view of your current project with the map displayed on the right side and a hierarchical view of all the file's hot spots on the left. This layout is particularly helpful for working with complex maps.

You can draw hot spots using any of the standard circle, rectangle-, and polygon-outlining tools. The zoom-in tool lets you draw polygonal hot spots that conform al-



CrossEye's cartoonish interface may put some off, but the package is easy to use and handles the basics well.

Editors' Choice

- Image-map editors: Web Hotspots 2.01
- GIF animators: WebImage 2.1, PhotoImpact GIF Animator 1.2
- Palette optimizers: DeBabelizer Pro for Windows 95/NT



Almost every tool reviewed here could be a useful addition to the Web designer's bag of tricks. But our Editors' Choice award winners are the ones you'll look to first for building image maps, designing GIF animations, and fine-tuning the size of graphics.

Web Hotspots 2.01 is a capable image-map editor for building hot spots and zooming in for close-ups. Its free-form tool lets your hot spot conform to any shape in the image. It outputs the necessary HTML and lets you test external page links by establishing an Internet connection.

WebImage 2.1 delivers a set of GIF animation tools, and its drag-and-drop editing is convenient. It also provides image-manipulation tools as well as filters, palette optimization, and image-map creation support. The bundled I Spy organizes image libraries and performs batch operations.

PhotoImpact GIF Animator 1.2 makes GIF animations feel like

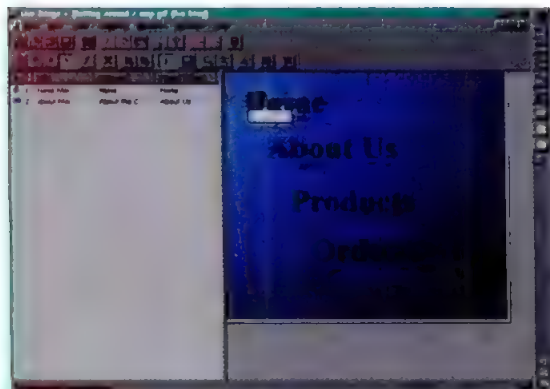
art. Its intuitive interface gets you up and running but without limiting features. Transition effects, image properties, palette information, and control over looping, transparency, and timing are all accessible.

DeBabelizer Pro for Windows is a slick PC version of the classic palette-optimization tool for the Macintosh. Web designers will value its SuperPalette for creating, editing, and applying uniform palettes. It also provides extensive format-conversion tools and a full set of image-manipulation features. DeBabelizer Pro is more than overkill for personal Web pages, but no professional should be without it.

most exactly to images in your source picture. Once a hot spot has been defined, you can add URL information and both target and internal text information by clicking on the area with the arrow tool.

LiveImage supports NCSA, CERN, and client-side image maps, and you can select any of these as your default map for creation. Once you've set all of your hot spots, simply save them as an HTML file and LiveImage generates all of the code you'll need. —AB

LiveImage 1.0. List price: \$29.95. Mediatech Inc., Cleveland, OH; fax: 216-526-2678; www.mediatec.com. Circle 442 on reader service card.



LiveImage's two-pane interface lets you keep track of multiple hot spots while viewing the image map.

Boutell.Com Inc.

Mapedit

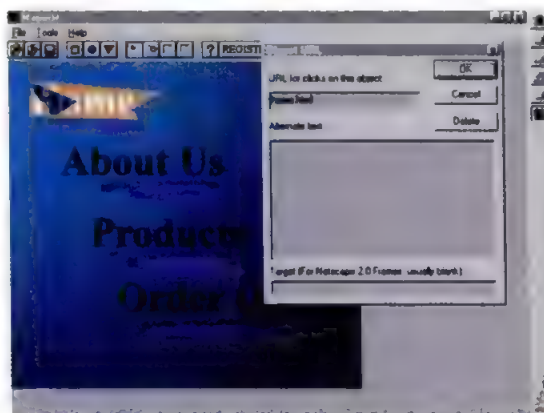
Mapedit 2.24's simple tools and minimal interface deliver all of the basics, but nothing really distinguishes this product from others in its price range. If you require only the very basic functionality of an image-map editor, however, and never want to see a line of HTML code, Mapedit (\$25) from Boutell.Com is worth a trial download.

The interface provides nothing more than a simple editing window and a toolbar. When you begin a new project, a window opens asking for an image file and the existing HTML or .MAP file in which your finished map will reside.

Once you have selected your files, you can draw hot spots with the standard circle-, rectangle-, and polygon-outlining tools provided. You can assign a URL, a target, and alternate text to any hot spot from within a pop-up editing window. In addition, the

program allows you to add points to any polygonal hot spot, but without any zooming tools, this feature is somewhat limited.

The program's test feature opens the same window used to assign URLs to hot spots, although it doesn't verify the information in any way. Mapedit saves files as CERN, NSCA, and client-side HTML



Not much distinguishes Mapedit except its ability to generate the full HTML page for your image map.

maps, and it generates all of the HTML code you'll need to use the new map on your Web site. —AB

Mapedit 2.24. List price: \$25. Boutell.Com Inc., Seattle, WA; 206-325-3009; www.boutell.com/mapedit. Circle 443 on reader service card.

Molly Penguin Software

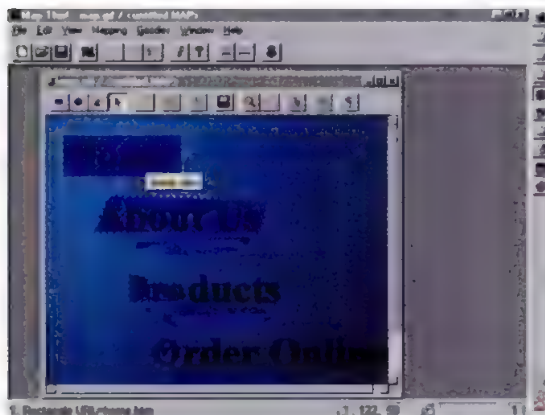
Map This

Map This 1.31, a popular freeware image-map creation tool by Todd Wilson, gives you the means to create detailed maps quickly and painlessly. Its inability to output complete HTML map code makes it somewhat more limited when the time comes for deployment. Even so, if you are an experienced HTML user, Map This, from Molly Penguin Software, delivers what you need at the best price of all.

To create a new image map, you first need to choose either a GIF or JPEG file to use as the basis for your map. Map This provides all of the standard tools for creating and editing hot spots, and it allows you to attach internal information to any links you create.

Client-side maps are saved as HTML files, and you can save multiple-image maps into a single HTML file and import maps from any existing HTML files. You will still need to enter HTML tags in your documents to use your maps, as the program does not generate these automatically. The online Help file contains guides for adding all the tags you'll need in order to use your image map, as well as assistance with most other problems you may encounter.

The author of Map This has gone on to create LiveImage (also reviewed in



Map This demands an HTML-savvy user, but it's reasonably feature-rich—and free.

this issue), so there will be no future updates, and only limited e-mail support is available.—AB

Map This 1.31. List price: Free. Molly Penguin Software; limited support from Todd Wilson via e-mail at tc@www

SUMMARY OF FEATURES

Image-Map Editors

■ YES □ NO

Products listed in alphabetical order

	CrossEye 1.0	LiveImage 1.0	Mapedit 2.24	Map This 1.31	Web Hotspots 2.01
Direct price	\$25.00	\$29.95	\$25.00	Free	\$49.00
User can create client-side/CERN/NCSA image maps	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Generates complete HTML code	■	■	■	■	■
Zoom/Free-form tool	■ ■	■ ■	■ ■	■ ■	■ ■
Provides tools for image creation	■	■	■	■	■
Internal/online testing	■ ■	■ ■	■ ■	■ ■	■ ■

.ecaetc.ohio-state.edu; www.ecaetc.ohio-state.edu/tc/mt. **Circle 444 on reader service card.**

1Automata

Web Hotspots



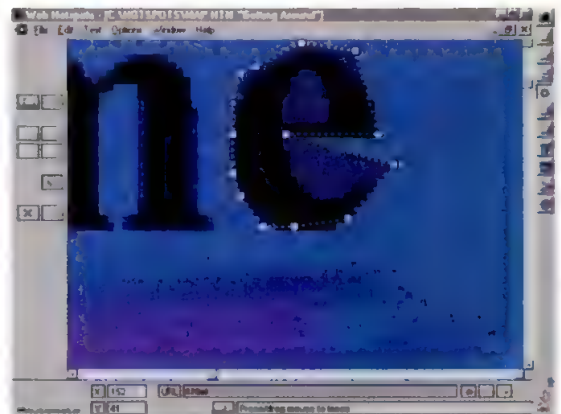
Web Hotspots 2.01 is a slick and powerful image-map editor that delivers consistent ease of use and powerful functionality from beginning to end of your project. Although it carries the highest price tag of the image-map editors we tested (\$49), Web Hotspots from 1Automata has enough extras to justify its place in your toolbox.

You can begin a project by selecting any GIF or JPEG file, or by opening an existing HTML file. The program even lets you download HTML pages directly from the Web for editing. In addition to the usual circle-, rectangle-, and polygon-outlining tools, Web Hotspots also gives you a strong free-form tool that allows you to create irregularly shaped areas, even those with irregularly rounded edges. The free-form tool is also effective when creating hot spots around individual letters or words. In conjunction

with the zoom tool, you can use the free-form tool to outline any shape in your graphic. Once a free-form hot spot has been drawn, you can go back and move or drag any of its points. When you save your new map, you can enter a title for the HTML page, a map name, comments, and the URL location for your image file.

With Web Hotspots, you can test the external hyperlinks in your image map online. Simply click on the hot spot, and the program will open up your Internet connection and verify the title of the page it finds.

The program can save files as both



Web Hotspots' free-form and zoom tools let you shape a hot spot to match any graphic.

NCSA maps or HTML files, with all of the necessary code generated directly into the file for you.—AB

Web Hotspots 2.01. List price: \$49. 1Automata; 800-242-4775, 713-524-6394; www.concentric.net/~automata/hotspots.shtml. **Circle 445 on reader service card.**

Our Contributors: ANDREW BOSCARDIN is an editorial researcher at PC Magazine, and RICK ROVEGNO is a technical analyst at PC Magazine Labs. THOMAS MACE was the senior editor in charge of this story, and JAY MUNRO was the project leader.

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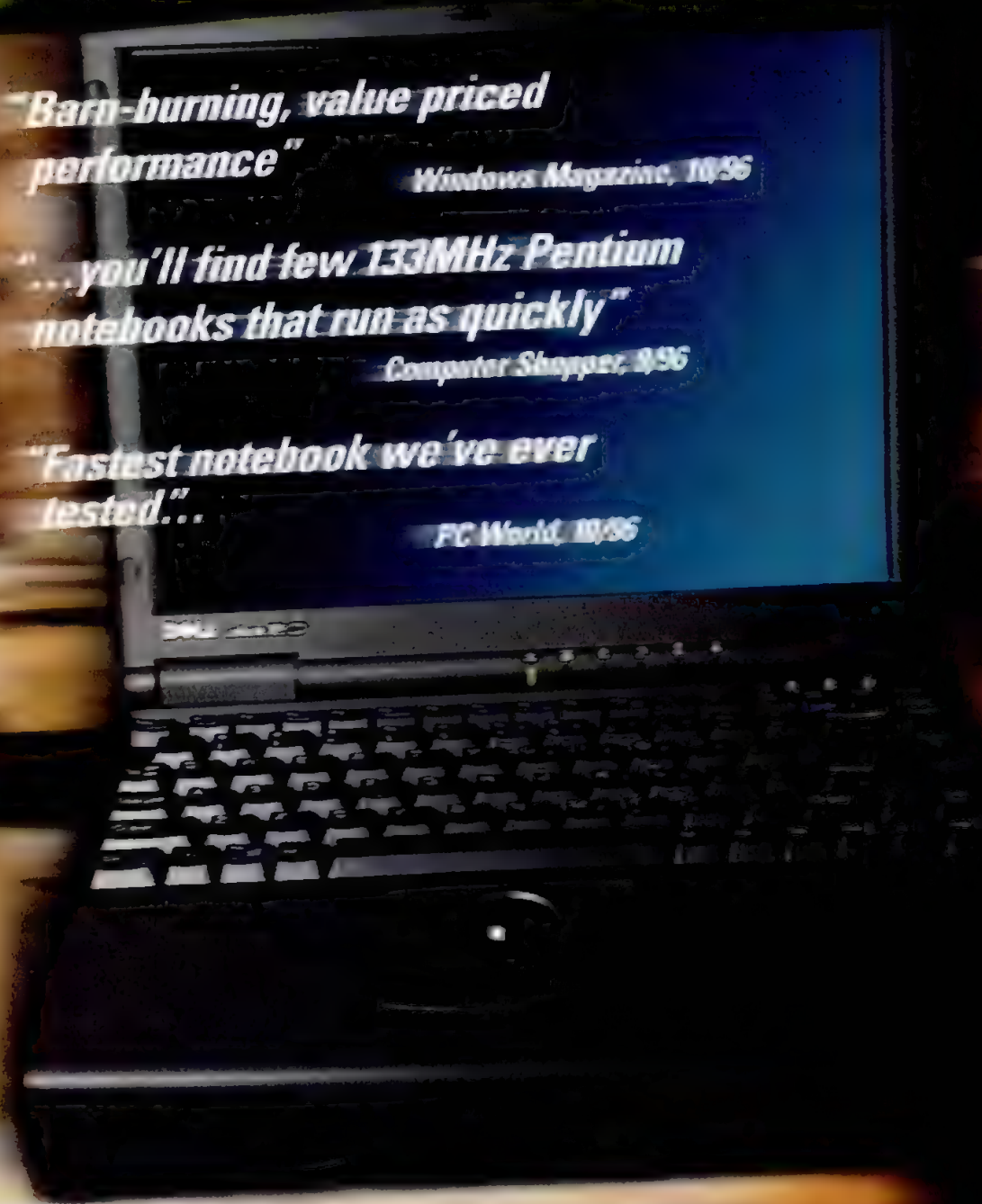
Windows Magazine, 10/96

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Computer Shopper, 9/96

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PC World, 10/96



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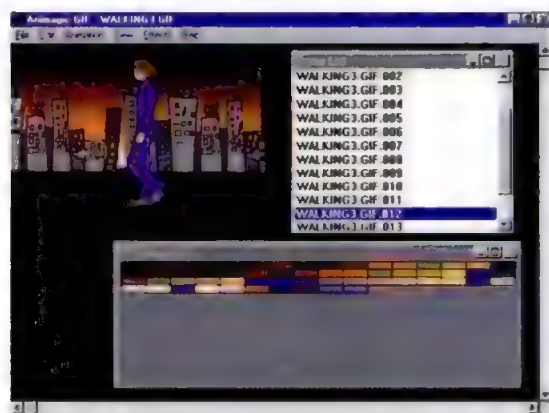
GIF ANIMATORS

Right to Left Software Inc.

Animagic GIF

Animagic GIF 0.91 (\$19), from Right to Left Software, in late public beta at press time, offers animated GIF creation in a simple process. After you've created .BMP, GIF, or .PCX images in a third-party program, you can build animations by importing images with the Insert and Append commands.

The interface couldn't be simpler. The active frame is displayed on the left, and a list of imported frames is on the right. You can view the individual frames of the ani-



Animagic GIF's simple interface shows the active frame, a sequence list, and the current palette.

mation by selecting frames in the list or selecting Play under the Animation menu.

A palette window displays the colors in use (up to 256). You can load or save palettes to .PAL files, although you cannot edit them. In testing, we found that importing a palette while viewing a frame created a palette conflict with that frame.

As an optimization feature, Animagic supports "Dirty Rectangles," where the smallest rectangle of change between successive images is calculated. Only the changes between frames are saved, reducing the size of the final file.

You can set frame rates per second for individual frames or for all those in the group. Animagic also has menu items for fade-in and fade-out transitions, but they were not active during our testing. If you're looking for a very simple GIF-creation tool, Animagic GIF, in its final-release version, promises to be worth a look.—Rick Rovegno

Animagic GIF 0.91. List price: \$19. Right to Left Software Inc., Toronto, Ontario; 416-489-7440; www.rtlsoft.com. Circle 446 on reader service card.

Alchemy Mindworks Inc.

GIF Construction Set

Offering a balance of flexible features and ease of use, Alchemy Mindworks' GIF Construction Set (\$20) is a good bet for managing most GIF animations.

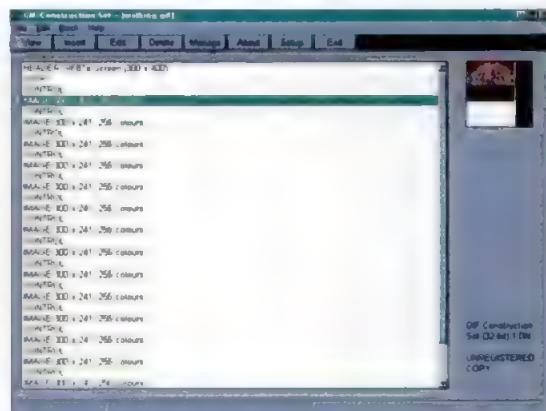
You can load existing GIF animations or .AVI files, or you can build new animations from individual image files. This is the only product we saw with an Animation Wizard tool that guides you through the entire creation process effortlessly.

After you've built an animation, the Manage function lets you easily control global settings such as user input, transparency, timing, and the way an image is removed after display. Options under the Edit function let you adjust the individual image size and palette settings.

You can get creative with ten transition settings, including wipes, horizontal split, and an effect called Sandstorm. The product also includes a dedicated banner-creator with support for slick features such as font-shadowing and emboss-

ing. Graphics and banners can be saved with transparent or colored backgrounds.

A Wide Palette GIF selection lets your GIF files display more than the 256 colors allowed by the GIF format. It works by combining the palettes of two sequential GIF frames and discounting the one transparent color on each—giving an effective display of 510 colors. This process works only with the Netscape Navigator 3.0 and the Microsoft Internet Explorer 3.0 browsers. The documentation also



GIF Construction Set gives you good control over global settings and individual images.

warns that results with this feature under a 256-color video driver could be awful. Despite this caveat, GIF Construction Set is a fast, feature-rich tool for creating animated GIF images.—RR

GIF Construction Set. List price: \$20. Alchemy Mindworks Inc., Beeton, Ontario, Canada; 800-263-1138, 905-936-9501; fax, 905-936-9502; www.mindworkshop.com. Circle 447 on reader service card.

SUMMARY OF FEATURES

GIF Animators

	Animagic GIF	GIF Construction Set	Microsoft GIF Animator	PhotoImpact GIF Animator	VideoCraft GIF Animator	WebImage for Windows 95
■ YES ■ NO						
Products listed in alphabetical order						
Direct price	\$19.00	\$20.00	Free	\$29.95	\$30.00	\$39.95
Animation wizard	■	■	■	■	■	■
User can create banners/add text	■	■	■	■	■	■
Graphics editor	■	■	■	■	■	■
Multiple-frame display	■	■	■	■	■	■
Transition settings (fades and wipes)	■	■	■	■	■	■
Cropping and resizing	■	■	■	■	■	■
Disproportional stretching	■	■	■	■	■	■
Converts AVI to animated GIF	■	■	■	■	■	■
Breaks out animation	■	■	■	■	■	■

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-PC Magazine, March 26, 1996

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Microsoft Corp.

Microsoft GIF Animator

Afreely downloadable supplement to the Microsoft Image Composer tool bundled with Microsoft FrontPage 97, Microsoft GIF Animator 1.0 is a simple program that delivers nearly everything you'd want from a GIF animator.

The application opens a floating window on the desktop rather than a full-size screen. Its interface, completely icon-driven and lacking standard Windows menus, is easy to use but surprisingly non-standard for a Microsoft product. To the screen's left, GIF Animator displays thumbnails of the frame sequence. To the right, a three-tab dialog box lets you control the animation's properties.

These properties are grouped into Options, Animation, and Image. Under Options, you can control aspects of how your animation is displayed in a browser with choices for dithering method and palette selection. Palette options include using the browser palette, an optimized palette, or a custom palette. Under Animation, you can adjust the animation's height, its width, and the number of loops it runs. The Image tab provides settings for the length of time each frame is displayed and the horizontal or vertical position of the image—if the size-setting under the an-

ly create effects frames yourself.

Microsoft does not provide phone support for GIF Animator, but the help files are clear, and the company hosts an Internet newsgroup for users. Considering how functional and simple this tool is, we can easily recommend it to FrontPage users or anyone else in need of a GIF animation tool.—RR

Microsoft GIF Animator 1.0. List price: Free. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax, 206-936-7329; www.microsoft.com. Circle 448 on reader service card.

Ulead Systems Inc.

PhotoImpact GIF Animator



With PhotoImpact GIF Animator 1.2 (\$29.95), creating animated GIF files becomes an art. Although it lacks wizards, its user interface is so easy to learn that you can achieve really good results in no time. PhotoImpact GIF Animator is available from Ulead Systems as a stand-alone tool or bundled with Ulead PhotoImpact 3.0, the company's full-featured image-editing package.

Nine transition effects, including blind, split, and spiral, give you variations for starting and closing your animations.

A preview window shows what each transition will look like beforehand. A tear-off toolbar provides information about (and lets you edit) global and individual image properties, palette information, background color, and looping. Clicking on an image brings up settings for the individual image title, position, transparency level, and time delays. An optional comment field is provided for descriptions.

The intuitive interface provides icons for inserting an image or video into your animation and previewing your creation. Arrow buttons let you move forward or backward in an animation one frame at a

time. The Export button lets you export some or all of the animation's frames as individual files or as a single animated GIF. The Add Banner Text dialog box allows you to create scrolling text banners anywhere within your animation.

You can zoom in and out of an image to get a better view. This is a remarkable creative tool to develop animated graphics for use on the Web. You can download PhotoImpact GIF Animator for a free 30-day trial to see for yourself.—RR

PhotoImpact GIF Animator 1.2. List price: \$29.95. Ulead Systems Inc., Torrance, CA; 800-858-5323; fax, 310-523-9399; www.ulead.com. Circle 449 on reader service card.

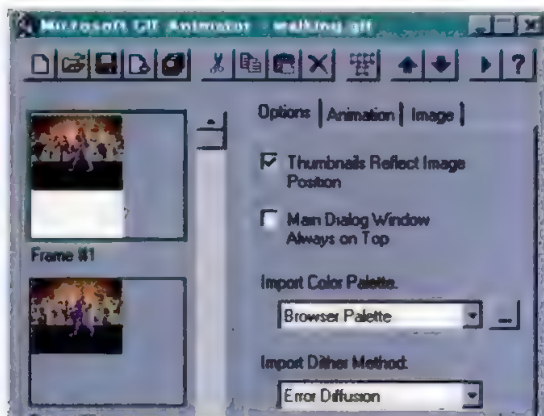
Andover Advanced Technologies Inc.

VideoCraft GIF Animator

If you've ever used Andover Advanced Technologies' PhotoMorph, the company's VideoCraft GIF Animator (\$30) will look very familiar. The vendor has converted that feature-rich video-morphing program into a reasonably priced, professional-quality GIF animation tool with an intriguing morph-capable niche all its own.

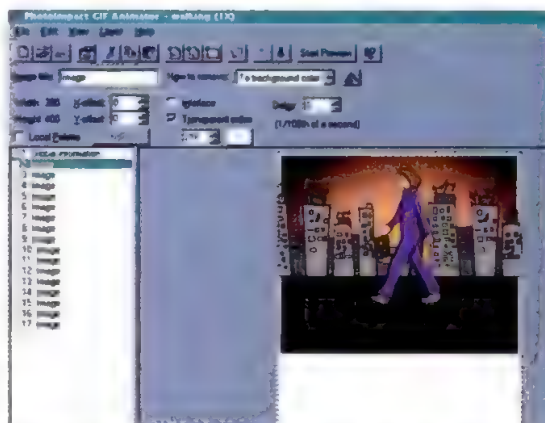
VideoCraft's strongest suit is special effects, which include the ability to morph images into striking animations. It also has a number of features that are more typical of full-blown image-editing packages. These include over 30 effects and filters such as blur, color depth, gamma, hue, masking, saturation, scaling, sharpening, stretching, and warping.

VideoCraft can open 14 different



Microsoft GIF Animator's nonstandard but polished interface makes this functional tool easy to use.

imation tab is larger than the actual image area. You can load existing GIF images, any image on the Clipboard, or .AVI video files. Although GIF Animator does not provide transition settings or effects, you can drag and drop images into Microsoft Image Composer and manual-



PhotoImpact GIF Animator's clear interface and powerful tools make GIF animation feel like an art.

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PC Magazine, Jan. 7, 1997
Best of Year Award

"...extremely flexible and surprisingly easy to configure..."

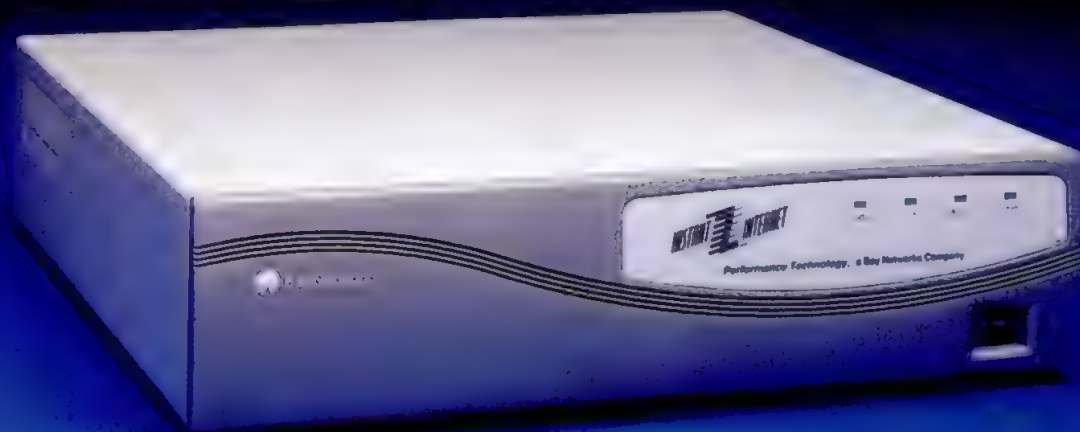


Network Computing, Sept. 15, 1996
Editor's Choice Award

"...easy installation, superior management features, and good performance..."



PC Magazine, Nov. 19, 1996
Editors' Choice Award



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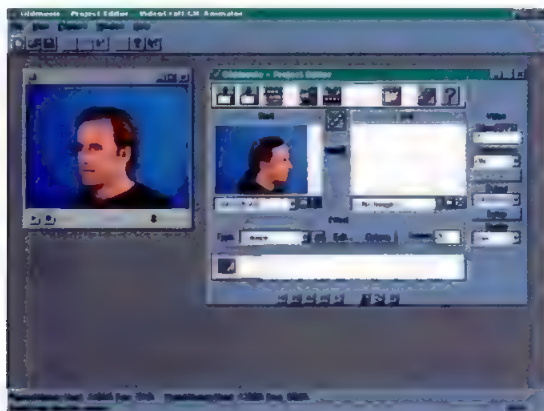
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INTERNET

Web Graphics Tools



Special effects, including morphing, earn VideoCraft GIF Animator a creative niche all its own.

graphics-file formats, including cross-platform formats such as the SUN Raster format and the Silicon Graphics RGB format. GIF Animator can also save individual files in these formats but can create movies only in animated GIF format, or as a sequence of frames.

With all its added power for special effects, VideoCraft is more difficult to use than other tools for straightforward GIF

animation. To create an animation sequence, for example, you edit the interaction between two frames at a time, specifying timing, effects, and ordering of the pairs. You view the pairs in a storyboard format and step through the sequence in the preview window. To see the actual animation, you must view your GIF file in your browser.

Complexity aside, the only drawback of this product is its inability to import and edit existing GIF animations. You can load .AVI video files to work with and convert them to GIF

animations, however. While not necessarily the best bet for quick work, this is the package to pick if you want all the power you can get to create spectacular morph-based, animated GIFs.—RR

VideoCraft GIF Animator. List price: \$30. Andover Advanced Technologies Inc., Acton, MA; 800-274-9674, 508-635-5300; fax, 508-635-5326; www.andatech.com. Circle 450 on reader service card.

Group 42 Inc.

WebImage



An impressive suite of useful utilities for working with Web graphics, WebImage 2.1 (\$39.95) from Group 42 specializes in GIF animations but also handles image-map creation and provides tools for converting graphics formats, resizing and rotating images, applying filters, and optimizing palettes. While it won't take the place of a dedicated image-creation package, it offers you lots of what you need to give images a final polish.

WebImage's tools for creating animated GIFs give you control over transition delay, background size, and color. You can use visual drag-and-drop editing for the sequence through thumbnails, an extremely convenient feature. WebImage can also create server-side (CERN and NCSA) and client-side image maps, outputting a .MAP file for the server and HTML code to the Clipboard for pasting into your HTML page.

WHO SAYS VIRUSSCAN'S MACRO



VIRUS RESEARCHERS.



Everyone says McAfee VirusScan is the world's most effective anti-virus protection. Independent tests prove it. Editorial reviews confirm it. And 68% market share leaves no doubt.

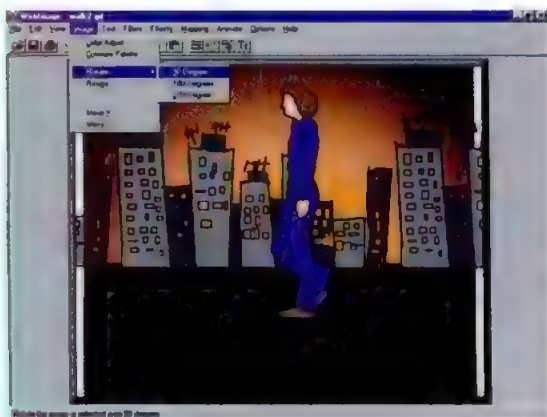
But for some reason, word hasn't reached our friends at Symantec. In a series of highly misleading ads, they claim Norton AntiVirus is superior virus protection.

Fortunately for you, those claims have been exposed and publicly condemned by

everyone from NCSA and *Virus Bulletin* to *Information Week*. The *San Jose Mercury News* referred to the incident as, "Symantec's little fib."

In Symantec's latest ad, they "test" Norton AntiVirus against VirusScan in detecting Word macro viruses. What they don't tell you is that they designed the test, supplied only the viruses that they could detect, and paid for the test themselves. *Secure Computing* calls the results "speculative."

At McAfee, we don't manipulate virus detection tests. We don't have to. As



More than just an animator, WebImage includes a host of powerful image-manipulation tools.

For image manipulation, WebImage supports image sizing and rotation in 90-degree increments. Its palette optimization feature lets you set color depth to control file size or add effects. You can adjust colors on all or separate RGB color channels. Available filters include Sharpness for more and less acuity, Equalize for correcting luminosity, and Noise for eliminating extraneous pixels from conversions or cap-

tures. The Emboss filter creates a two-tone bas-relief effect suitable for background images or logos, and the Invert filter mimics a photographic negative. The transparency editor gives you the option of setting a transparent color or using the eyedropper to make a color in the GIF or .PNG image appear transparent. You can add text to any image in vertical or horizontal orientation, using your system's fonts.

WebImage 2.1, combined with I Spy—a utility for organizing graphics that can display directories of images, rename or delete them, and perform batch-format conversions, is available from Group 42's Web site in a fully functional trialware version. Professionals want a dedicated tool for creating artwork, and WebImage gets it animated and on the Web in style.—Jay Munro
WebImage 2.1. List price: \$39.95. Group 42 Inc., Milford, OH; 800-520-0042, 513-831-3400; fax, 513-831-8289; www.group42.com. Circle 451 on reader service card.

PALETTE OPTIMIZERS & ANTI-ALIASING TOOLS

Equilibrium

DeBabelizer Pro for Windows 95/NT



DeBabelizer Pro for Windows 95/NT (\$595), from Equilibrium, has long been one of those packages Mac users point to when explaining why they don't use PCs. Finally, this premier tool for palette optimization and format conversion is available for Win32 platforms.

For Webmasters, DeBabelizer Pro's strongest feature is its SuperPalette, a powerful tool for creating custom palettes of 256 colors or fewer and applying them to images automatically. In 8-bit color environments, this is a must for avoiding palette conflicts and matching quirky browser palettes.

DeBabelizer Pro provides over 20 standard SuperPalettes, including the Netscape Navigator 3.0 and Windows-system palettes. You also can create unlimited

VIRUS PROTECTION IS THE BEST?

"McAfee beat all other products in macro virus detection."
—Secure Computing Magazine

"Symantec's macro virus tests show flaws and may be biased." —NCSA

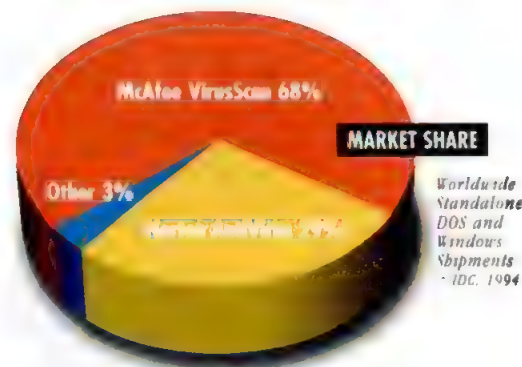
"The results show the technology is there for McAfee to come up trumps."
—Virus Bulletin

INDUSTRY EXPERTS.

you can see from the *independent* tests above, VirusScan has consistently proven to provide the best protection from not only macro viruses, but viruses of all kinds.

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custom palettes by sampling an image or groups of images. You can even edit a SuperPalette simply by dragging an icon from an image's titlebar onto a Super-Palette window. Dragging the same image several times weights the palette for that image. Image import and conversion are another DeBabelizer Pro strength. The Windows version supports reading and writing of over 30 basic image types, often in multiple flavors.

Anyone who needs to convert or process large numbers of images will welcome the powerful scripting and batch-pro-

Quarterdeck Corp.

HiJaak PRO

Palette optimization and anti-aliasing are only two of many functions offered by Quarterdeck Corp.'s HiJaak PRO 4.0 (\$99.95 street), and not necessarily its strongest. But Web designers still will find the huge utility collection a useful aid in tackling problems that crop up when working with images in multiple formats.

HiJaak PRO's strong point is its ability to load, display, and convert over 30 bitmapped image types. It also handles a

large, eclectic selection of metafile, vector, and 3-D formats including VRML. Web designers who find themselves faced with relatively obscure Mac, PC, SGI, and Unix formats will find it a boon. HiJaak PRO also provides raster-to-vector image tracing, a flexible screen-capture tool, and basic image-manipulation tools such as Brightness, Contrast, Gamma Correction, Rotate, and Resize. Tools for cataloging, thumbnailing, managing, and searching image libraries help to keep track of files.

Web designers constantly face the need to make images smaller. Resize, used with the anti-aliasing Smoothing option, let us reduce screenshots and other text-heavy graphics to 70 percent of their original dimensions while maintaining readability. HiJaak PRO's palette-reduction and palette-optimization features were less successful. With images containing skin tones, we could not achieve an attractive re-

sult using 256 colors without applying dithering. A dithered image usually is larger than a nondithered one because it compresses less well under GIF. HiJaak PRO lets you manually control individual color conversion, but this approach isn't suited to batch conversions.

HiJaak PRO is not intended to be a full image-editing package and may not be the last word in palette optimization. But it's still a vital tool for anyone wrestling with multiple formats and large libraries.—TM

HiJaak PRO 4.0. Street price: \$99.95. Quarterdeck Corp., Marina Del Rey, CA; 310-309-3700; fax, 310-309-4217; www.quarterdeck.com. Circle 453 on reader service card.

Digital Frontiers

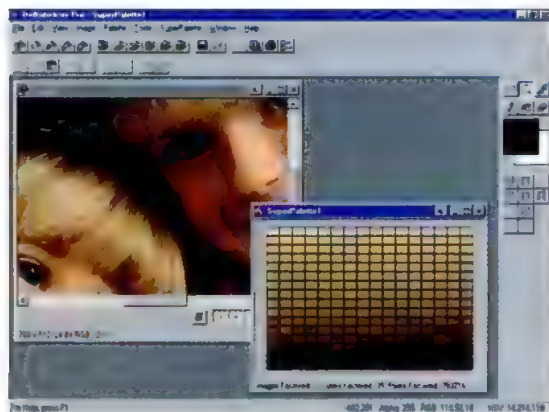
HVS Color

Aworthy addition to any graphic artist's bag of tricks, HVS Color 1.2.2 (\$99), from Digital Frontiers, is an Adobe Photoshop plug-in for shrinking the size and color palette of graphics meant for the Web. HVS Color works by analyzing the entire image, then using available colors where they're needed most. During testing, flesh tones received enough differentiation to be convincing, while dark backgrounds were considerably flattened.

We achieved good results simply by opening a 24-bit RGB file in Photoshop, then exporting it using HVS Color's 256-color default. The overall effect was superior to both simple and dithered color reduction in Photoshop alone. The current version outputs to a .BMP file, which you must convert to a GIF.

You can manually adjust the depth of the palette (from 2 to 256 colors), and set thresholds for greater control. Since HVS Color renders some areas as pure colors (as opposed to dithering them), GIF's LZW compression is able to work with greater efficiency, making the image even smaller.

HVS Color 2.0, a new release expected by the time this review appears, will be implemented as a filter instead of a more cumbersome export module. It will natively support the creation of



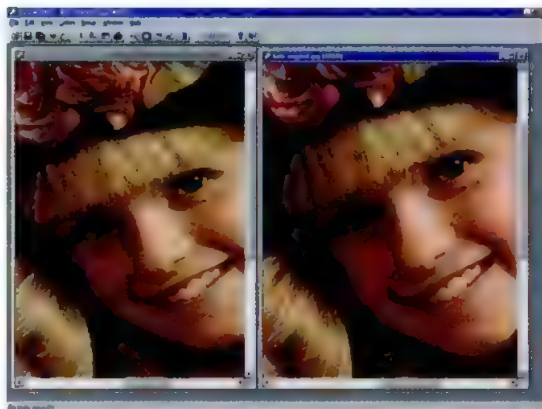
DeBabelizer Pro lets you create and fine-tune custom palettes from one or more images.

cessing features. You can operate on open files, or on a Windows folder, or add files to batch lists by dragging them from the Windows Explorer. Many useful scripts for targeting Web-browser palettes are included.

While not designed to replace a dedicated image editor, DeBabelizer Pro does include a number of powerful image-manipulation tools. Among them are facilities for image resizing; setting DPI resolution; adjusting contrast, intensity, and RGB values; controlling brightness, hue, and saturation; and adjusting the gamma curve. Its new Internet Wizard can produce low-resolution GIFs, thumbnails, and a higher-resolution JPEG version of a selected image.

Long a standby on the Mac, DeBabelizer Pro is a welcome addition to the PC platform. Its port will be a must for professional Web designers.—Thomas Mace

DeBabelizer Pro for Windows 95/NT. List price: \$595. Equilibrium, Sausalito, CA; 800-524-8651, 415-332-4343; fax, 415-332-4433; www.equilibrium.com. Circle 452 on reader service card.



HiJaak PRO's palette reduction and palette optimization (left) slim down a 24-bit original (right) through dithering.

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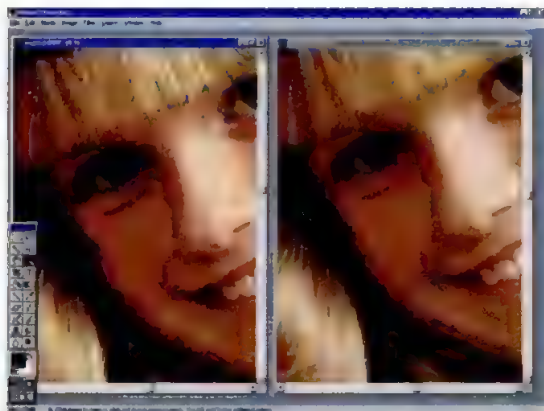
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HVS Color applies a limited palette intelligently (right), as opposed to simple palette reduction (left).

GIFs and GIF animations, and will provide tools for predicting download times. You will be able to adjust the emphasis of selected colors manually and create superpalettes that apply a single palette to a collection of images. The new release will support dithering and let you confine it to a selection of the image. —TM

HVS Color 1.2.2. List price: \$99. Digital Frontiers, Evanston, IL; 800-328-7789, 847-328-0880; fax, 847-869-2053; www.digfrontiers.com. Circle 454 on reader service card.

Ulead Systems Inc.

PhotoImpact GIF/JPEG SmartSaver

Graphics meant for the Web can never be too thin. Ulead Systems' PhotoImpact GIF/JPEG SmartSaver 1.1 (\$29.95) is a very useful tool for helping you slim down existing GIF or JPEG images through manipulation of palettes and compression parameters. Its real-time visual feedback with side-by-side comparison of the original and altered images makes it particularly intuitive to work with. PhotoImpact can be purchased directly from Ulead's Web site and is included as part of Ulead's full-featured image-editing tool, Ulead PhotoImpact 3.0 with WebExtensions.

PhotoImpact can output either GIF or JPEG images. You select the output type when you first open an image, and your selection determines the available options.

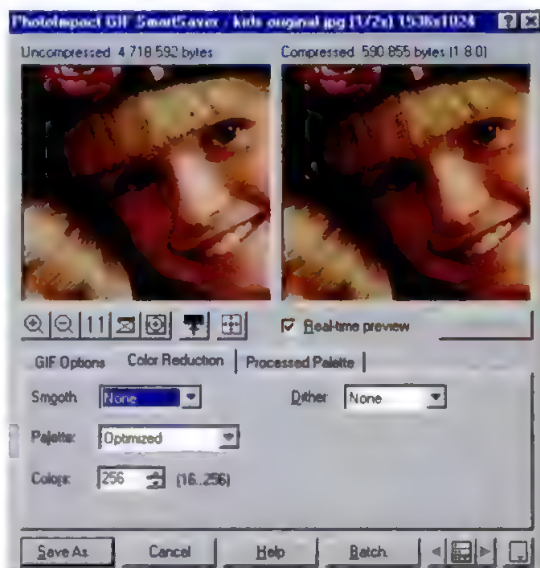
With GIF selected as your target output, image-manipulation options appear grouped under three tabs. The GIF Op-

tions tab lets you select between standard and interlaced GIF formats. A Transparent Area option provides an eyedropper tool for selecting a color or group of colors to appear transparent. Options under the Color Reduction tab include the ability to set a color depth anywhere from 16 to 256 colors, apply a smoothing algorithm in one of ten different intensities, and to select a palette.

Available palette choices include an adaptive, optimized palette; Netscape Navigator 3.0 or Microsoft Internet Explorer 3.0 palettes; and the application of a custom palette. PhotoImpact creates a palette on the fly as you experiment with any image, and you can save such palettes for application to other images. While more cumbersome than DeBabelizer Pro's SuperPalettes, these palette files let you apply a common palette to a group of images. You can view the current palette under the Processed Palette tab and examine the RGB values for each indexed color. You cannot edit the palette directly, however.

If you select JPEG as your output type, the interface appears slightly different, with the option tabs replaced by a single panel for controlling image parameters. A slider lets you adjust for best compression on a scale from 0 to 100, with instant visual feedback on the degree of pixelation as you increase the compression ratio. A Mode op-

tion lets you create standard or progressive JPEG images, and a Standard Optimized option attempts to create the smallest possible nonprogressive image. A Subsampling option lets you further tune the file size by changing the way pixels are evaluated during compression. The Smooth option



PhotoImpact's before-and-after view makes GIF and JPEG image tuning an intuitive process.

is comparable to the same option for GIFs.

As you experiment with either GIF or JPEG images, you can record successive versions in a history log, which then lets you view or revert to any past state. To help you test the effect of different image-manipulation options as quickly as possible, PhotoImpact has a useful Batch mode for generating a specified number of images automatically from a single source within a specified range of color depths or compression ratios.

PhotoImpact needs to be used in

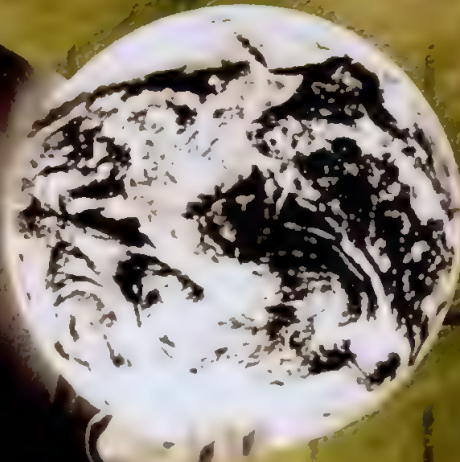
SUMMARY OF FEATURES

Anti-aliasing/Palette Optimization

	DeBabelizer Pro	HiJaak PRO	HVS Color	PhotoImpact GIF/JPEG SmartSaver	Smooth Scaling
■ YES ■ NO					
Products listed in alphabetical order					
List price	\$595.00	\$99.95	\$99.00	\$29.95	\$129.00
Alters bit depth/image dimensions	■ ■	■ ■	■ ■	■ ■	■ ■
Applies filters	■ ■	■ ■	■ ■	■ ■	■ ■
Extensive format conversions	■ ■	■ ■	■ ■	■ ■	■ ■
Applies smoothing or anti-aliasing	■ ■	■ ■	■ ■	■ ■	■ ■
Batch-processes images	■ ■	■ ■	■ ■	■ ■	■ ■
User can create custom palette	■ ■	■ ■	■ ■	■ ■	■ ■
User can edit custom palette	■ ■	■ ■	■ ■	■ ■	■ ■

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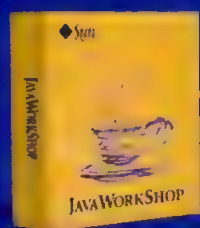
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conjunction with a full-blown image editor, but it performs its functions extremely well. Even if you're not a PhotoImpact user, this utility is more than worth its modest price. —*TM*

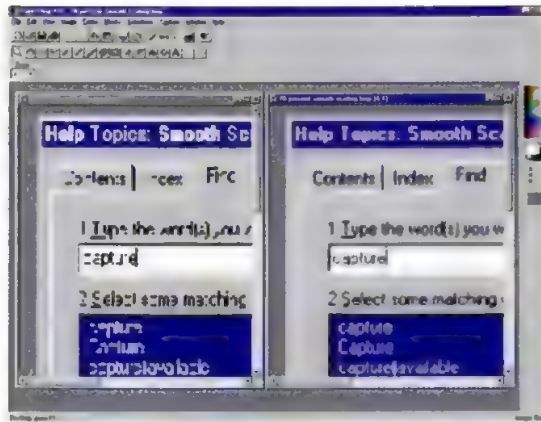
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WexTech Systems Inc.

Smooth Scaling

Of all the graphics you might want to post on a Web site, screenshots are among the most problematic. In their original form, they're large (300K for a 256-color VGA image) and correspondingly download-intensive. But shrinking them to a more efficient size causes severe distortions that can render fonts illegible.

WexTech Systems' Smooth Scaling 2.0 (\$129) applies anti-aliasing technology to the problem to let you reduce the size of screenshots or other bitmapped graphics while keeping fonts readable.



Smooth Scaling's anti-aliasing algorithms help you slim down text-heavy bitmaps.

Converting existing screenshots is straightforward. You can open a .BMP or .DIB file directly into Smooth Scaling or access other formats such as GIF or JPEG through the Windows Clipboard. The Resize Image option lets you specify the amount of reduction you want as a percentage of the original, or as a target width or height in pixels. The aspect ratio of the original is maintained automatically. You also

can enlarge the image if required.

Smooth Scaling will work with a 16-color image, although its anti-aliasing algorithms are more effective with 256 colors. Its Batch mode lets you convert groups of screenshots to a specified size. There's also an integrated screen-capture facility.

During testing, we were able to reduce text-heavy screenshots to 50 percent of their original size while maintaining some degree of legibility. Reductions of just 70 to 80 percent produced far better results. The only thing we missed were a few amenities such as the

ability to view original or reduced screenshots under magnification to check our results. Smooth Scaling is available as a stand-alone package or bundled with WexTech's impressive authoring suite Documentation Studio Windows Help (\$850).—*TM*

Smooth Scaling 2.0. List price: \$129.00. WexTech Systems Inc., New York, NY; 800-939-8324, 212-949-9595; www.wextech.com. Circle 456 on reader service card.

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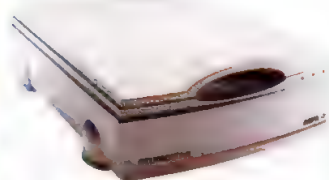
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CAPTURE THE COLOR

If you need to transfer text and color images to your PC for documents or Web pages, one of these 17 flatbed scanners is right for you.

By M. David Stone

Scanners aren't just for artists anymore. Sheet-fed page scanners are turning up in keyboards, photo scanners are built into PCs, and a good color flatbed scanner—complete with image-editing and OCR software—is now more affordable than a typical personal laser printer.

Who needs it? Probably you. Since the paperless office remains more myth than reality, business users still get inundated with hard-copy reports and articles they need to digitize, be it to file in a searchable format or to send to others electronically. Anyone with a Web page has a good reason to scan color images. And of course graphic artists—the traditional target audience for scanners—still need to capture images for layouts. In short, a scanner is the next

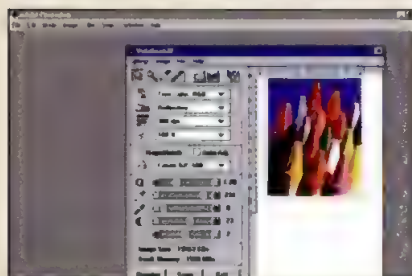


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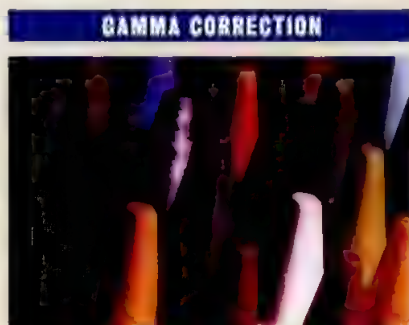
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Scanning Terms: A Visual Glossary

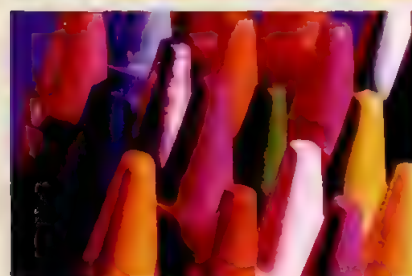
The arena of color scanning has a parlance all its own. Here are some of the terms that you'll need to know, with a few thousand words' worth of visual explanation.



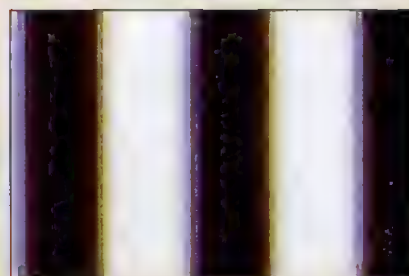
The standalone scanning program each scanner includes is called a *Twain driver*. More advanced Twain drivers (such as Microtek's ScanWizard and UMAX's VistaScan, shown here) give users a lot of control over image attributes in an intuitive format.



Gamma correction is an advanced image-editing step that lets you modify a scanner's contrast level at different levels of brightness. Changing the gamma setting brightens or darkens an image. In the samples above, we brightened an overly dark scan (top) using gamma correction.



Color balance and the related *color accuracy* describe how true-to-life the colors reproduced by a scanner are. These samples show an accurate scan (top) and one where the scanner's magenta bias turned white areas pinkish.



Proper *color registration*—how well the red, green, and blue components of a scan align—is important, especially for line art. Proper registration (top) shows clean edges. In an image with poor registration, a color halo will be evident.

must-have peripheral for mainstream PC users, and the scanner market is heating up.

North American sales of mass-market scanners almost doubled from 1995 to 1996, compared with just 25 percent growth per year before that, according to InfoTrends Research Group in Kansas City, Missouri. Last year shipments totaled more than 3 million units, with one-third of those being color flatbed models.

COLOR SHIFT

As scanners are growing more popular and more affordable, the market is moving toward color. One major reason is the phenomenal penetration of quality low-cost color ink jets into the home and SOHO segments. Users now have a means to print out near-photo-quality images—and they want those images to be their own. Another key issue is that today's computers have the horsepower for color scans. The combination of high-capacity hard disk, fast processor, and 24-bit color that you need for manipulating color images is close to entry level today.

InfoTrends points out that most people need a scanner primarily for black-and-white (or *monochrome*) scans for faxing, OCR, occasional copies, and document storage. In fact, more than 50 percent of scanning done today is monochrome. But even people who expect to do 95 percent of their scanning in black-and-white still feel that color is useful, and they're willing to pay the price premium for color. As a result, black-and-white scanners are going the way of monochrome ink jet printers and monochrome monitors before that: to Memory Lane. Almost all flatbed scanners are now color, and even personal sheet-fed page scanners are heading in that direction.

REVIEW CRITERIA

So for this roundup we tested color flatbed scanners aimed at the home, business, and graphics markets. To qualify, a scanner had to offer 24-bit color depth and 300-dpi resolution or better and cost less than \$2,500 on the street. Eleven manufacturers submitted current models in time for testing, priced from \$300 to \$2,500, and we let the five market-leading companies submit two

Editors' Choice

- Mainstream business and SOHO/home users: UMAX Vista-S12
- Graphics professionals: Microtek ScanMaker III



There are two distinct markets for color flatbed scanners, each with vastly different requirements. Business and personal users need an easy-to-use device that

will handle both document scanning and color scanning at an affordable price. For those users we recommend our Editors' Choice, the UMAX Vista-S12 (\$500 street). The combination of value and performance delivered by the 24-bit, 600-dpi Vista was unparalleled in this roundup. Its Twain driver for image capture is both robust and approachable. The driver's range of image controls means that, for most business and home color-scanning tasks, you'll never have to deal with a second image-editing package. If you should need to (or want to), the base bundle includes Adobe's PhotoDeluxe image editor; more sophisticated users can opt for the professional-level Adobe Photoshop for just \$200 more. The Vista's accurate color images were judged third best overall by our panel.

Graphic artists need top-tier color image quality as well as low-level control over

image attributes. The 36-bit, 600-dpi Microtek ScanMaker III (\$1,500 street), also an Editors' Choice pick, delivers on all fronts. Microtek's ScanWizard Twain driver is arguably the best in the business, with a host of image controls and prescan options. The ScanMaker III package includes the full version of Adobe Photoshop as well as a transparency adapter, which makes this bundle a

relative bargain in this segment. As for image quality, our jury panel judged the ScanMaker III's images best in show among the 17 scanners we reviewed. If you need top-quality images for a corporate Web site or graphics production work, the ScanMaker III is an ideal choice.

For home and SOHO users on a budget, the HP ScanJet 5p (\$400 street) is a solid choice and merits an honorable mention. Its image quality was among the best we saw from an entry-level 24-bit, 300-dpi scanner, ranking sixth overall with our jurists. Its PictureScan Twain driver takes point-and-click scanning to the extreme; in fact, we found ourselves wishing for the more robust image-capture control of HP's DeskScan II driver, which the company plans to make available for 5p customers on its Web site. For its ease of use, affordability, and image quality, the ScanJet 5p deserves consideration.



Editors' Choices: UMAX Vista-S12 and Microtek ScanMaker III.

or more products (for a total of 17 products).

Most business and home users will find themselves choosing between a color flatbed scanner, such as the ones reviewed here, and a personal sheet-fed scanner like the Visioneer PaperPort. If you're interested in scanning only pages (or stacks of pages) for faxing, OCR, and document capture and management, a sheet-fed scanner is the obvious choice. Many personal sheet-fed scanners can handle stacks, and at about \$270, they're generally less expensive than flatbeds.

If you need to scan bulky objects such as pages from a book, or scan color images for graphics, you need a flatbed scanner. And with a flatbed scanner, you can have it all. Fourteen of the scanners covered here offer automatic document feeders (ADFs), priced from \$250 to \$600, that handle from 25 to 60 sheets.

Still another benefit of a flatbed scanner is that you can often outfit it with a transparency media adapter to scan transparencies, including 35-mm slides. Fifteen of the scanners in this roundup include transparency units in the base price or offer them as options (priced from \$200 to \$650).

OUR TWO BITS ON BITS

One of the most potentially confusing claims for scanners is the number of *bits* they offer. Unfortunately, these numbers mean different things, depending on the scanner.

In theory, a 24-bit scanner offers 8 bits, or 256 shades, for each of the three primary colors—red, green, and blue (RGB). That's a total of 16.7 million colors, the maximum most high-end graphics boards will display. A 30-bit scanner offers 10 bits, or 1,024 shades, for each color. A 36-bit scanner offers 12 bits, or 4,096 shades. Complicating matters is

that almost all 30- or 36-bit scanners use the extra bits internally only, sending just a final 24 bits to the computer. (The exception in this roundup is the AGFA Arcus II.) That's just as well, since there is very little PC software to take advantage of additional bits in any case. So what's the point of the extra bits? The answer lies in what goes on inside the scanner.

HOW THEY WORK

Desktop scanners include a light source, a lens, a charged-couple device (CCD), and one or more analog-to-digital converters (ADCs). The CCD's elements are all in a row, with one element for each pixel in a line. If you have 300 CCD elements for each inch across the scanner, you have a maximum potential optical resolution of 300 pixels per inch, also referred to as dots per inch (dpi). If you have 600 CCD elements for each inch,

you have a potential optical resolution of 600 dpi.

When you scan an image, you scan one line at a time. The light bounces off the target and goes through the lens to the CCD. Each CCD converts the light to an analog voltage (which varies with the intensity of the light) and indicates the gray level for one pixel. The ADC converts the analog voltage to a digital value, using 8, 10, or 12 bits per color.

The advantage of more bits per color is simple: More bits means smaller steps in the intensity of the hue levels, steps subtle enough to be imperceptible to the human eye. That, in turn, diminishes *posterization*—sudden shifts in color from one pixel to the next where there should be a smooth gradation. It also lets you see more detail in dark areas, depending on the quality of other components in the scanner.

Another important assumption is that you're getting all the bits the manufacturer claims. As already noted, the only bits that count are the ones that the scanner uses for gray scale. But that doesn't mean that some vendors don't count the calibration bits to pump up the specifications. Be skeptical of claims of 36 bits in inexpensive scanners (in the \$300 to \$700 range).

Happily, choosing the number of bits you need is straightforward. If you don't expect to scan photos very often, 24 bits

should be enough. If you'll be scanning photos or artwork regularly, you'll want a high-quality 30 bits to give you better detail in dark areas. Don't bother with 36 bits unless you'll be working with lots of transparencies: Transparencies have a greater density range than prints and can benefit from the extra bits to show more detail in dark areas.

*The advantage of
more bits per color is
simple: More bits
means smaller steps in
the intensity of the
hue levels.*

RESOLUTION ISSUES

Resolution is probably the second most important issue in a scanner. Most manufacturers give resolution as some number by some other number, typically 300-by-600, or 600-by-1,200. The true *optical resolution*, however, applies in one direction only (the *x* axis, or horizontal plane), and is determined by the number of CCD elements and the quality of the lens. The second number that most manufacturers give is sometimes called the *mechanical resolution*, since it

indicates the minimum movement of the scanner's mechanics—the number of steps per inch that the scanner takes in the *y* direction. This figure is typically double the optical resolution. (Note that some marketing departments like to put the larger number first, claiming, say, 1,200 by 600 dpi, because it looks more impressive. You're on safe ground if you assume that the actual optical resolution is the lower number.)

The reason you need the extra steps of mechanical resolution is because of problems you'll otherwise run into with *interpolation*. Interpolation guesses the values for pixels at a finer level than the scanner samples them, based on the values of nearby pixels.

It's easy to interpolate between two measurements on the same scan line because the scanner measures the entire line and has all the information available. It's harder to interpolate in the other direction—to fill in an interpolated line—because the scanner hasn't scanned the lines after the interpolated line yet. By taking extra steps in the *y* direction, you eliminate the need to interpolate in that direction.

Scanners that offer higher interpolated resolutions than the scanner's optical and mechanical resolutions (and that's most of them) do their interpolation for the higher resolutions at the computer. That gives them the luxury of being able to receive later lines in the image before they interpolate between lines.

Unfortunately, both the scanner-based and software-based interpolations can be less sophisticated than the interpolation routines in a sophisticated program such as Adobe Photoshop, the premiere image-editing tool for high-end users. You'll often get better results by scanning at the maximum optical resolution for the scanner, and then resampling at a higher interpolated resolution in your image editor. The only way to find out, though, is to try it both ways. You may also find that the best choice depends on the type of image, so that you may be better off using the scanner's interpolation for line art and the image editor's interpolation for photos.

One other point about resolution: For most purposes, a high-quality 300-dpi optical resolution is enough. You need a 600-dpi optical resolution only if you plan to

HIGHLIGHTS

Scanners: Breaking into the Mainstream

Traditionally, scanners have been brought into the office to perform a specialized niche task: image capture for DTP, text document management in a law firm, and so on. With Web pages cropping up from everyone and color ink jet printers sprouting everywhere, scanners are fast becoming valued all-purpose desktop tools, not unlike printers and modems.

Scanner flavors General-purpose desktop scanners come in flatbed and sheet-fed varieties. Sheet-feds are monochrome units primarily used for document capture, faxing, and OCR. Flatbed scanners offer that same functionality, plus the ability to capture full-color images for Web pages, presentations, or a calendar for Grandma.

Getting bit(s) Seven of the units we tested were 24-bit, five were 30-bit, and three were 36-bit. All but one (the Arcus II), however, use only 24 bits internally, meaning that they send only 24 bits back to the computer. The extra bits aren't wasted, however. A higher bit depth means you'll see less posterization and more detail in dark areas.

The resolution game A scanner's optical resolution—in this roundup, 300 dpi or 600 dpi—applies in one direction only. So why do vendors claim 600-by-1,200 or 1,200-by-300 resolution? The higher number represents the mechanical resolution. Mechanical resolution allows for interpolation, which improves image quality by guessing RGB values for pixels at a finer level than the scanner samples them.

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scan small targets—such as slides—and enlarge them. If you scan a 1-inch target at 600 dpi and then enlarge it to 4 inches, the resolution of the enlarged image will be 150 dpi. That's easily enough for a good quality printout on any desktop printer. But if you started with 300 dpi, the enlarged image would be 75 dpi. That's appropriate for viewing on-screen but not for printing.

THE SOFTWARE SIDE OF SCANNERS

Any scanner you get should come with a *Twain driver*, which will typically function as a standalone program for scanning, as well as scan images directly into most Windows programs. If an application supports Twain (which has retroactively come to stand for *technology without an interesting name*), it usually lets you call up the Twain driver by entering a scan (or *acquire*) command. If it doesn't support Twain but does support OLE, you can use OLE to call up the driver and insert the scanned image.

Early Twain drivers were uniformly primitive, falling short on ease of use, control over scanning, or both. Some drivers still fit that description. But most of the units in this review—most notably the Epson, HP, Microtek, and UMAX scanners—have made large strides in ease of use for better scanning control. In some cases, they even qualify as mini image-editing applications, so novice and mainstream users can make whatever tweaks they need to an image without ever having to learn a second software package.

Almost all scanners today also come with scanner-related applications for optical character recognition (OCR), image editing, and sometimes other applications as well. Unfortunately, most image-editing software has been designed for graphic artists and designers who are willing to make an effort to learn how to use powerful but often arcane tools. With scanners becoming more popular, though, there has been movement in the industry toward easier-to-use image-editing software. Adobe's

Making What You Scan What You Print

Your freshly scanned and printed image rolls out onto the printer tray, but the result is disappointing—a far cry from the original. What went wrong? Here are some guidelines for getting it right.

■ **Resolution.** If you're scanning line art, scan at the highest resolution your scanner allows, up to matching the printer resolution. For photos, if you'll be scanning only a few images, it won't hurt to set the scanner to the highest optical resolution it offers. The file sizes will be larger, but you'll have the maximum detail possible should you enlarge the image or zoom in.

When storage space is a concern—and at about 6.5MB for a typical 300-dpi, 4- by- 6-inch image, it probably is—you can safely set your scanner resolution lower and still not see an appreciable difference in the final printout. If the image will be printed by a device that uses a *line screen* (professional presses and most color ink jets, for example), a good rule of

thumb is to set the scanner resolution to twice the line screen the printer uses. If your output device uses *error diffusion dithering* (many ink jets, color lasers), set the scanner to two-thirds or three-quarters of the printer's resolution. For printers that don't dither (thermal dye), scan at the printer resolution (usually 300 dpi). To stretch or shrink the image size, you'll need to adjust the original scanning resolution proportionately.

■ **Calibration.** To make sure your printer reproduces the colors of your original properly, you have to map the colors the scanner sees to the colors the printer prints. The software drivers or image-editing applications bundled with many scanners offer calibration software that includes an output target. Simply print out the calibration image, then scan it. The software compares what the printer *actually* printed with what it *ought* to have printed and creates a color profile that automatically adjusts for the printer's biases.

PhotoDeluxe and Ulead's PhotoImpact (bundled with three of the scanners we tested) are good examples. More sophisticated users, on the other hand, should look for a bundle with a more robust image editor, such as Adobe Photoshop (included with eight of our tested units).

If you're new to image editing, you should plan to spend some time learning new concepts for both the scanning step and the image editing. *Gamma correction*, for example, essentially lets you modify contrast level at different levels of brightness. Changing the gamma setting can make a tremendous difference in an image, and understanding gamma correction will help you get better results at both your scanner and your image editor. You'll also want to experiment with the various other controls in

your Twain driver to learn how they affect the image.

IMAGE IS EVERYTHING

Ultimately, the most important issue for any scanner is image quality. Understanding what most affects image quality will not only help you make a more informed buying decision but will also help you take best advantage of whatever scanner you get.

High on the list is *color balance*, the ability to capture neutral colors in neutral form. If you scan a black-and-white photo in color and the result has a color tinge, you can bet that the colors will be off on your color photos, too. A closely related issue is *color accuracy*, or the ability to capture colors that closely match the original. On our tests, we found that the default settings for several scanners, including AGFA's Snap-Scan and StudioStar and PlusTek's OpticPro, imparted a pinkish cast to scans.

For any given scanner at any given setting, both tonal quality and color accuracy will vary depending on the screen

Our Contributors M. DAVID STONE, DANIEL GROTTA, SALLY WIENER GROTTA, and ALFRED POOR are contributing editors of *PC Magazine*. LORI GRUNIN is a frequent contributor to the magazine, and TONI KISTNER is a staff editor. JAMIE M. BSALES was the associate editor in charge of this story, and JEFF MACE was the project leader.

or printer you're using to look at the result. That's why an easy-to-use *calibration* feature is critical. Keep in mind that images that look good on screen will not necessarily look good at the printer, and images that look good at the printer may not look good on screen. You'll want to calibrate for both screen and printer; make sure you use the appropriate calibration file when you scan, typically by telling the Twain driver the final destination for the image.

Noise level and the closely related *signal-to-noise ratio* are important indicators of how much detail you'll be able to see in a scan. When you look at our low-level test results, keep in mind that we ran our tests at the scanner's default settings, and that you can change the signal-to-noise level substantially by changing settings in the Twain driver. For example, scanners from HP and Epson showed poor signal-to-noise results. But these scanners' defaults also tend to brighten an image, which adds noise. Turning down the brightness settings also reduces the amount of noise in an image. On the other hand, our Editors' Choice winners (the Microtek ScanMaker III and UMAX Vista-S12) stayed truer to the original image with their defaults and registered better results here.

Color registration—a measure of how well the three colors line up with each other—isn't usually an issue for color photos but may be an issue if you're scanning line art. If the registration is off, you will see an extra "halo" of color at the edges. When you're printing to an ink jet or laser printer or scanning to a Web page, even a full pixel off is generally acceptable in a 600-dpi scan, though it will be noticeable to those who look for it in 300-dpi scan.

Another critical factor is how much effort you have to put into a scanner to get good results. You probably won't be happy with any scanner if you limit yourself to slapping a page on the flatbed and giving a scan command at the default settings. Some scanners may come with defaults that are meant for a particular kind of output, and some seem to be picked almost at random. Be prepared to put some effort into learning how to take best advantage of your scanner, but give lots of extra points to packages that

don't assume you have a sophisticated understanding of what you're doing. AGFA, HP, Microtek, and UMAX, for example, have done a good job of making it easy for an unsophisticated user to change settings and take better advantage of the scanner.

Finally, keep in mind that image quality can be a subjective matter. The default settings of the HP scanners, for instance, tended to boost and oversaturate colors to impart a warmer tone to photos. This could be a desirable effect for many users, even if it's not precisely true to the original.

Ultimately, being able to take full advantage of a lesser scanner may be more important than having a better scanner that you can't figure out how to use. The reviews that follow should help buyers at every level find the right fit of features, ease of use, and image quality.

AGFA

SnapScan, StudioStar, Arcus II

AGFA has long been a major player in the high-end graphic arts business. The three models we tested range from the professional-level Arcus II (\$1,900 street) to the mid-level StudioStar (\$850 street) and down to the SOHO targeted SnapScan (\$330 street). Though all the scanners generally performed well for their respective classes,

all come up short on at least one side of the price/performance ratio when compared with competing units.

Installing and configuring all three scanners was quick and easy. They ship with AGFA's Twain driver, FotoLook, which could stand an interface-lift. Though it gives you control over all the important scanning parameters, we found it harder to navigate than necessary. The StudioStar and SnapScan also come with a simpler, "one-click to scan" driver, FotoSnap. The Arcus II bundles a version of FotoTune, AGFA's color management system. Unfortunately, FotoTune isn't widely supported on the PC platform.

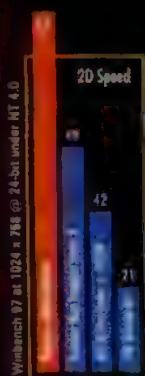
The Arcus II is \$400 more expensive than its main competitor, the Microtek ScanMaker III, also reviewed here. It does deliver one advantage over the Microtek: The Arcus II is both internally and externally 36 bit. Unfortunately, this feature is currently of dubious benefit: Only Photoshop can receive the 36-bit data, and it can't really use it. Many graphics professionals agree that you're actually better off letting the scanner map to 24-bit before it passes the bitmap on. As more applications and color-matching systems adapt to utilize this data, though, this feature may begin to pay off.

In general, the Arcus II performed reasonably well. It was ranked second (behind the Microtek ScanMaker III) for color-image quality by our jury panel but



AGFA's SnapScan, StudioStar, and Arcus II.

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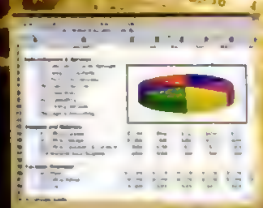
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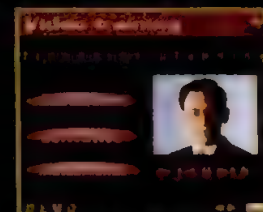
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*Quote from PC Computing Dec 1996. **Estimated street price for 4 MB. All performance tests conducted by Matrox Graphics Inc. on a Dell Pentium Pro 200MHz system with 32 MB of RAM and 256K cache. Matrox Millennium, Number Nine Imagine 128 Series 2 and ATI 3D Pro Turbo + PC2TV and STB Velocity 3D were configured with 4 MB of memory for the PCI bus using driver releases 2.33.013, 4.102.16, 3.0.71 and 4.0.0 respectively for Windows NT 4.0. Winbench 97 business tests conducted at 1024 x 768 resolution with 24-bit color at 75 Hz using small fonts under Windows NT 4.0.

showed some clipping in the shadows under default settings. Its low-level test results fell mostly within the acceptable range, the only exception being our Resolution test. Even though the Arcus uses a trilinear CCD array with 600-dpi resolution interpolated to 1,200 dpi, its test results—and those of the similarly specced StudioStar—show the resolving power of a 300-dpi unit. This performance is unacceptable for scanning 35-mm photos and negatively affects line art and OCR tasks as well. During informal testing, we were able to boost the resolving power slightly by decreasing the line-art threshold by about 15 percent.

The two lower-end scanners fared in a like manner. Our jury ranked the 30-bit StudioStar a respectable fifth on color-image quality. Unfortunately, that puts it behind two significantly less expensive units (the 30-bit Microtek ScanMaker E6 and the 24-bit UMAX Vista S-12). Though the image displayed excellent saturation at the default setting, it also exhibited an overall pinkish cast.

The StudioStar, unfortunately, has the same resolution problem as the Arcus II. In addition, it turned in poor results on many of our other low-level tests: Its Color Registration, Ghosting, Black Noise, and Black Level results were all disappointing.

The entry-level 24-bit SnapScan is certainly low priced, but it is still tough to recommend the unit even to casual users. Our jury ranked its color-image quality the worst of the group because of an overly dark scan with a visible reddish cast. And its low-level results ranged from the merely adequate to the unacceptable when compared with its 300-dpi competitors.

The Arcus II, StudioStar, and SnapScan might have been eagerly received by the market about two years ago. In today's more competitive environment, however, you can find a better, cheaper alternative to each of them.—*Lori Grunin*

Arcus II. Street price: \$1,900. **StudioStar.** Street price: With Photoshop LE, \$850; with Photoshop, \$1,000. **SnapScan.** Street price: \$330. AGFA, Ridgefield Park, NJ; 800-227-2780, 201-440-2500; www.agfa-home.com. *Circle 460 on reader service card.*

Epson America Inc.

Expression 636 Pro

On the surface, Epson's Expression 636 Pro seems like a great deal: A 36-bit scanner that can be found on the street for as little as \$900. But delving a bit deeper revealed why a higher bit-depth alone doesn't guarantee better image quality.

Epson offers the unit in three versions, differentiated by software bundles. The Executive Model (\$900 street) ships with Photoshop LE and Textbridge Pro 96; the Artist Model (\$1,300) provides the full version of Photoshop, Kai's Power Tools, and Claris HomePage, among others. We looked at the Professional Model (\$1,800 street), which includes a transparency adapter in addition to the same software bundled with the Artist Model.

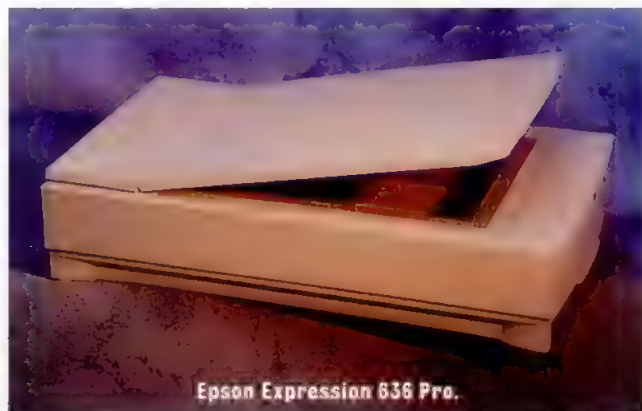
Part of the Expression's weakness stems from its Twain driver, Scan II!, which lacks the power and flexibility we saw in other drivers. For instance, while you can adjust parameters—such as exposure, gamma, and the tone curve—in Scan II! in quarter-tone increments, you can do so only on the master RGB channel. By contrast, Microtek's ScanWizard lets you perform most operations on the individual RGB channels.

On our color-image-quality jury tests, the Expression placed in the middle of the pack; unfortunately, that puts it behind less expensive (and less impressively spec'd) units such as UMAX's Vista-S12, AGFA's StudioStar, and HP's ScanJet 5p. Although our test image showed no clipping in the shadows or highlights, we thought it looked washed out because of low contrast. This impression was supported by our low-level test results: The scanner's Black Noise score fell into the visible range, and its Signal-to-Noise and Black Level scores were the worst of the group.

On the other hand, the Expression's color registration, uniformity, and effective resolution results exceeded those of

its higher-priced competitors, Microtek's ScanMaker III and AGFA's Arcus II. Its good performance on these parameters made it possible to fix contrast problems by selecting the black-and-white points in Photoshop manually. Also, for OCR tasks, the Epson's Text Enhancement Technology significantly improved the quality of text at small point sizes.

The Expression 636 isn't a bad scanner, and when you count the value of the bundled software in the Professional version, it's a good deal. It's just not as great a deal when compared with the



best of the 30-bit units.—*LG*

Expression 636 Pro. Street price: \$1,800. Epson America Inc., Torrance, CA; 800-463-7766, 310-782-0770; fax, 310-782-4214; www.epson.com. *Circle 461 on reader service card.*

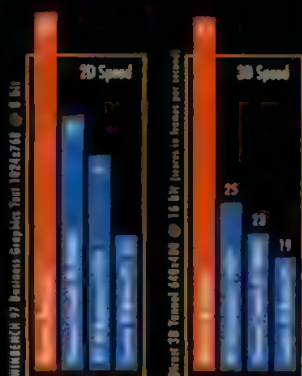
Hewlett-Packard Co.

ScanJet 5p, ScanJet 4c

HP sent two scanners to our roundup. The ScanJet 5p (\$400 street) is a light-duty scanner for the home, home office, or truly small office; the ScanJet 4c (\$900 street), a medium-duty scanner aimed at small-business users, is designed to handle most common scanning tasks—from stacks of text pages for OCR to line art, graphics, and photos. Both packages hit their targets reasonably well.

Both scanners come with an assortment of software, including Corel's PhotoPaint for image editing, Caere's OmniPage Limited Edition for OCR, and Visioneer's PaperPort for managing scanned documents and sending them to other programs. HP adds a utility that links the scanner to your printer for added copier functionality. (The U.S. retail ver-

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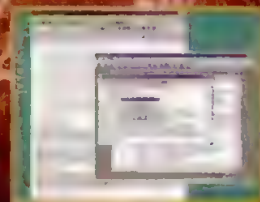
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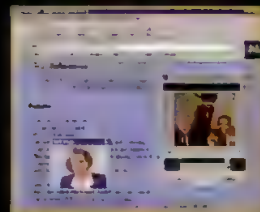
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*Estimated street price for 2 MB. **Game bundle available with retail version only. All performance tests conducted by Matrox Graphics Inc. on a Dell Dimension P200 V configured with Intel P6-200 MHz, 16 MB of SDRAM and 256K cache. Matrox Mystique, Diamond Stealth 3D 2000 XL and ATI 3D Xpression + PC2TV were configured with 2 MB of memory for the PCI bus using driver release 3.30, 4.03.00.2106 and 3.0 respectively for Windows 95. Creative 3D Blaster PCI was configured with 4 MB of memory for the PCI bus using driver release 1.01 for Windows 95. WinBench 97 business test conducted at 1024 x 768 resolution with 8-bit color at 75 Hz refresh using small fonts under Windows 95. Microsoft Tunnel test run at full screen 640 x 400 resolution with 16-bit color at default manufacturer refresh rate based on Gouraud shading, perspective correct textures, point sampled and z-buffer.

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sion of the ScanJet 5p also includes Corel's Web.Designer for HP.)

The entry-level ScanJet 5p's optical resolution is 300 dpi, interpolated to 1,200 dpi, with a 24-bit color depth. One indication of its home/home-office orientation is the lack of a document feeder or transparency options. Another, more welcome one, is its small size: At 5 by 12 by 19 inches (HWD), the 5p is a fine solution when desktop space is at a premium.

The 5p's Twain driver, PictureScan, carries ease of use to extremes. There's no need to set resolution or any parameter directly; it sets parameters for you based on the image and printer type you've selected. While this may be welcome to novices, more sophisticated users will find the lack of control frustrating. If they do, they can download the more advanced DeskScan II 2.4 Twain driver from HP's Web page. This version was not available when we tested, however, so we could not set the parameters we needed for our performance tests.

In subjective evaluations of image quality, our jury ranked the 5p an admirable fifth overall. Images were crisp and colors bright. Purists might even argue that the colors were *too* bright—brighter than the originals. Still, the images were pleasing to the eye. The 5p is an affordable solution for home-office, light-duty scanning where ease of use counts more than image control.

HP's high-end unit, the ScanJet 4c, tries hard to deliver everything a business user could want. Its 600-dpi optical resolution (interpolated to 2,400 dpi) and 30-bit color depth are fine for most tasks. The scanner also offers a 50-page automatic document feeder (\$559 list) and a transparency unit (\$759 list). You can implement only one of these at a time, though, because each unit replaces the flatbed cover.

The transparency unit is notable for ease of use. Unlike transparency units on other scanners, this model has a translucent white surface that allows light to pass through for scanning transparencies but also serves as a background for page scanning. Another nice touch is the transparency unit's autonomous power switch: If the transparency adapter is powered up, the scanner is ready to scan transparencies; if it's

Scanner Output Compared

The proof is in the output, and the 17 scanners we tested produced widely varying images. For our jury testing, we scanned original 8-by-10-inch prints at each scanner's default settings. Jurors then viewed the electronic images on a color-calibrated monitor and rated each according to its likeness to the original.

The photo (composed and photographed by *PC Magazine* contributing photographer Thom O'Connor) tests a host of attributes important to quality color scanning. Thanks to Crayola, we can judge a scanner's ability to accurately render color across the entire spectrum. Its ability to resolve detail can be seen in the textures of the crayons and their paper wrappers. We can see how much detail the scanner retains in shadow areas, and judge if it produces hot-spots in highlight areas. For comparison, the sample below was produced by an outside service bureau on a Scitex drum scanner used for professional prepress work. It is as close to the original photograph as is possible.

We were surprised to find that image quality did not directly correlate with a scanner's color depth or list price. The two scans judged best by our panel—those from the Microtek ScanMaker III and AGFA Arcus II—were indeed from 36-bit high-end scanners aimed at graphics professionals. But the correlation ended there. Our jury rated images from the 30-bit Microtek ScanMaker E6 and 24-bit UMAX Vista-S12 as tied for third place, for instance.

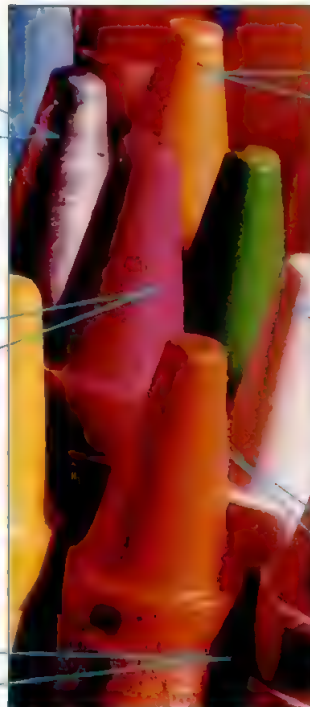
Because most of these scanners are aimed at the general business and home user rather than the graphic artist, we scanned using the Twain driver's default settings (as we feel most users would) rather than take full advantage of the driver's options. Note, however, that you can change the scans significantly by learning about and changing the settings.

Reading the Output Samples

Look for color accuracy in each crayon. The silver and yellow crayons were especially tough to reproduce.

Better scanners will reproduce the horizontal swirls around the crayon tops, as well as the texture of the wrappers.

Look to see that detail and color accuracy were maintained in shadow areas, rather than a quick fade to black.



Highlight areas should show good detail, without artificial posterization or hot spots.

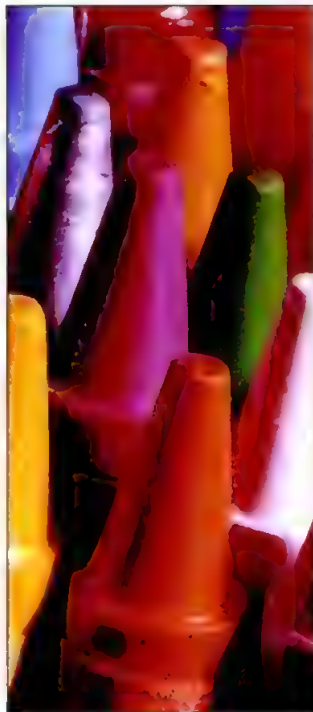
The white crayon should be pure white, not tinged with a hint of magenta or blue.

The edges of the crayons should be clearly delineated, not jagged, blurry, or pixelated.

HARDWARE
Color Scanners



AGFA SNAPSCAN: 24-bit, 300-dpi, \$330. Too dark, with a red cast overall. Detail lost in shadow areas. Jury ranking: 15th.



AGFA STUDIOSTAR: 30-bit, 600-dpi, \$850. Excellent overall color saturation. Slight pinkish cast. Jury ranking: 5th.



AGFA ARCUS II: 36-bit, 600-dpi, \$1,900. Excellent color accuracy and saturation. Overall good detail, with a little clipping in the shadows. Jury ranking: 2nd.



EPSON EXPRESSION G38 PRO: 36-bit, 600-dpi, \$1,800. No clipping in the highlights or shadows, but the image lacks snap. Jury ranking: 7th.



HP SCANJET 5P: 24-bit, 300-dpi, \$400. Bright, crisp images, though colors look artificially bright compared with original. Jury ranking: 6th.



HP SCANJET 4C: 30-bit, 600-dpi, \$900. A lot of color saturation; perhaps too much. A bit posterized. Jury ranking: 11th.



INFO PERIPHERALS IMAGEREADER FB: 30-bit, 300-dpi, \$330. Colors look dull and the image is dark. Note the soft focus. Jury ranking: 14th.



MICROTEK SCANMAKER E6: 30-bit, 600-dpi, \$600. Excellent overall image quality, with good detail. A bit dark, perhaps. Jury ranking: 3rd (tied).



MICROTEK SCANMAKER III: 36-bit, 600-dpi, \$1,500. Sharp and crisp, with accurate colors. Some clipping in the highlights. Jury ranking: 1st



MUSTEK PARAGON 600 II SP: 24-bit, 300-dpi, \$300. Accurate color and shading. A little too dark, however. Jury ranking: N/A



NIKON SCANTOUCH 110: 24-bit, 300-dpi, \$300. Good detail for the resolution, with accurate colors. Image lacks snap. Jury ranking: 10th.



NIKON SCANTOUCH 210: 24-bit, 600-dpi, \$730. Correct, consistent colors with good saturation. Perhaps a bit dull. Jury ranking: 8th (tied)



PACIFICIMAGE SCANAGE III: 36-bit, 600-dpi, \$900. Good detail and crispness. Bright colors, but not completely accurate. Jury ranking: 12th



PLUSTEK OPTICPRO 4800P: 24-bit, 300-dpi, \$250. Good detail for the resolution. Overly dark scan, with a strong magenta cast. Jury ranking: 8th (tied)



RICOH FS2: 30-bit, 600-dpi, \$2,500. Good color quality, though overall too dark. Details are lost in the shadows. Jury ranking: 13th.



UMAX VISTA-S12: 24-bit, 600-dpi, \$500. Rich, accurate colors. Good detail, although a bit soft. Jury ranking: 3rd (tied)

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off, the scanner is set to page scan.

The Twain driver, DeskScan II, is suitably straightforward, with features that control the process so well that post-scan image editing might not be necessary. It offers brightness, contrast, and scaling controls, choices for type of image (ranging from black-and-white drawings to color photos), a preview button, and a zoom button to magnify the portion of the target image. Also worth mentioning is an automatic exposure button that adjusts brightness and contrast based on the currently selected image area. A look through the menus will yield screen and printer calibration features, resolution settings, and more, including a handy option for changing the preview window size. One annoying trait, however, is the scanner's inability to remember the set selection size in between scans; if you're doing multiple scans of one original, you must reset the selections for each scan.

Our jury ranked the ScanJet 4c's output quality eleventh out of 15 scanners. However, this decision was due primarily to a high degree of color saturation—an effect that some people may prefer. On our low-level tests, the 4c ranked in the first tier for Resolution and Black Level, which makes this entry a good choice for OCR and line-art scanning. Other test results were mid-pack or slightly below, some of which we attribute to an alarming amount of dust and dirt that was sealed inside the unit we received from HP. We

purchased another 4c at a local computer store to try our tests anew but found the same problem. HP is looking into the matter.

Because the ScanJet 4c works so automatically, it isn't the best choice for graphic artists, who are likely to find themselves disabling some of the default features to increase control. It is, however, well suited to the typical business user who wants no-fault scans.—*M. David Stone*

ScanJet 5p. Street price: \$400. **ScanJet 4c.** Street price: \$900. Hewlett-Packard Co., Palo Alto, CA; 800-722-6538, 408-246-4300; www.hp.com. Circle 462 on reader service card.

Info Peripherals

ImageReader FB

If you're a small business or home user in the market for an easy-to-use device for text and occasional color scanning, the ImageReader FB (\$330 street) is worth consideration. The least expensive 30-bit scanner in our roundup, the 300-dpi ImageReader produced good objective test results but garnered mixed reviews of its color output overall.

The package includes a modest assortment of image editing, OCR, and Internet software. Installation and setup were remarkably unexciting—from out-of-box to first scan took less than 10 minutes. We were also impressed with the scanner's documentation: Info Peripherals took the time and trouble to produce an excellent explanation of many scanning terms, such as color gamut, scanning for output, and line screens.

Setting up the



Info Peripherals' ImageReader FB.

scanner's Twain driver is a two-step process that requires first installing the driver, then its InfoCenter application. To scan, you first launch the Control Panel, where you select a task such as scan, copy, fax, or OCR. The main scanning sub-program, Viewer, has only basic preview and acquisition tools. However, InfoCenter is a comprehensive business program that includes an address database for faxing.

The scanner did well on some of our low-level tests, exhibiting a low Signal-to-Noise ratio and a good Color Registration result, in particular. Despite this, scanning at default values (as we did on all our tests) produced color scans that were dark and dull; hence our jury ranked the ImageReader's output near the bottom.

We were able to improve the images by intensifying the brightness and increasing the contrast through the Twain driver, though we also noted some color inaccuracy and an overall soft-focus look to the scans. The ImageReader, however, fared better than other 300-dpi units on our Resolution test, which makes it a good choice for line art and OCR tasks for users who can't step up to a 600-dpi scanner.

Info Peripherals' ImageReader FB is a fine device for line art scans and a good value for users who intend to use it for such tasks as optical character recognition, faxing, copying, and occasional color photo scanning.—*Daniel Grotta & Sally Wiener Grotta*

ImageReader FB. Street price: \$330. Info Peripherals, Campbell, CA; 800-777-3208, 408-538-2500; www.infoconnection.com. Circle 463 on reader service card.



HP's ScanJet 4c and ScanJet 5p.

EIZO NANAO WINS AGAIN!

Back To Back Nod For Monitor Maker

By Rez O. Looshun
MONITOR STAFF WRITER

LOS ANGELES — It's an announcement that is becoming all too familiar. EIZO Nanao Technologies has once again taken home the coveted Editor's Choice Award from PC Magazine.

This sixth award in the past six years goes to the company's FlexScan® TX-C7S 17-inch class color monitor. It's an honor that carries particular significance as it cites superiority in the judging category having the toughest standards.

"The TX-C7S monitor's image was especially sharp and clear, with no detachable faults," said a PC Magazine judge.

Not too surprising for EIZO, though. The company's monitors previously earned Editor's Choice



October 8, 1996 FlexScan TX-C7S

accolades in 1990, 1992, 1993—for its FlexScan 9400, F550iW and FlexScan F340iW monitors—and last year for its highly regarded FlexScan T2-17TS model.

TX-C7S Lauded as 'Best of the Best'

By E.Z. Viewin
MONITOR STAFF WRITER

LOS ANGELES—Words such as "unbeatable," and "top flight," have been flying around town ever since EIZO Nanao's FlexScan TX-C7S 17-inch class color monitor walked off with the 1996 PC Magazine Editor's Choice Award.

With this key award under its belt, the FlexScan TX-C7S figures to be the monitor of choice for graphics and business professionals who demand crisp, true-to-life colors and stable screen images



This year's big winner: The FlexScan TX-C7S 17-inch class color monitor.

for desktop publishing, 24-bit imagery, high-end graphics and multimedia applications.

Editor's Choice: The Award That Shapes Industry Thinking



It's deja vu all over again: EIZO Nanao has now won six Editor's Choice Awards in six years.

By Mona Turr
MONITOR STAFF WRITER

LOS ANGELES—Winning a PC Magazine Editor's Choice Award tells the world of hungry hardware buyers that you've arrived in a big way.

"It's the one award we all dream about, the one we covet more than any other," said N.V.S. Guy of Silicon Valley's LuzerCom.

EIZO Nanao monitors have earned worldwide recognition for dependability, cost-effective performance and pleasing, ergonomic design. In fact, I'm going to stop writing this story right now so I can call EIZO Nanao Technologies at 1-800-800-5202. Then again, I could get an informational fax on demand by calling 1-800-416-FLEX. Either way, like the TX-C7S, I'm a winner.



EIZO is Nanao's New Universal Brand Name
EIZO Nanao Technologies Inc., 5710 Warland Dr., Cypress, CA
90630 Web Site <http://www.eizo.co.jp/welcome>

PERFORMANCE TESTS

Color Flatbed Scanners



The scanners that performed the best on our tests all provided a mix of tuned hardware (the optics and electronics) married to a strong set of features present in the Twain driver interface.

What the Numbers Mean

None of the scanners in this roundup have the grade of optics and circuitry you would need to create your own four-color prepress scans; that class of machines starts at \$10,000. Still, these relatively low-cost scanners can produce quite acceptable results for the business user. Graphics designers will want to opt for the higher-end 36-bit units, and they may need to spend some time in an image-editing program, cleaning up the final scan. We were surprised to find manufacturing and quality-control shortcomings on some of the scanners that leave them prone to dust collection or even damage under the glass scanner bed.

What was perhaps more surprising, though, was the way the software and firmware present on some of the scanners were able to compensate for physical shortcomings and abnormalities and render good scans, as was shown by our jury testing. The software

present in the Twain drivers can fix many problems resulting from electronic and optical aberrations.

Note that for all our tests we used the vendors' default settings, which do not yield the optimal results in all cases. An end user has a significant amount of leeway to improve (or, for that matter, worsen) an image. Most vendors carefully select default settings based on a scanner's intended market, while some evidently put little thought into the default settings. Users are best served by a product whose Twain driver makes it simple to change scan settings to match what is being scanned to the desired output.

The scanners we tested fell into two distinct categories: high-resolution (600 dpi) and low resolution (300 dpi), as borne out by our Resolution test. The units that produced the highest numbers in our Resolution test were all 600-dpi, although some 600-dpi scanners—such as AGFA's StudioStar and Arcus II—were able to produce only a relatively low resolution. The cause may be poor focus, as a blurred image will yield low scores. The best performers were the Epson Expression 636 Pro, the HP ScanJet 4c, and the Nikon Scantouch 210.

We were surprised to find that some scanners had very high noise levels, as shown by our Signal-to-Noise and Black Noise tests. The Epson Expression and HP ScanJet 4c turned in poor results, which directly correlated to the vendors' default settings. On the HP, for instance, noise was far less noticeable when we set the gamma correction curve to "none" in HP's DeskScan II Twain driver utility. Results of a retest sent out to KDY showed the same findings. The scanner producing the least noise was the Ricoh FS2.

▲ Higher scores represent better performance.
▼ Lower scores represent better performance.
Bold type denotes first place.

	Jury Test Rank ▼	Resolution Line pairs per mm ▲	Signal-to-Noise Score ▲	Color Registration Pixels ▼	Uniformity Pixels ▼	Ghosting Pixels ▼	Black Noise Pixels ▼	Black Level Score ▼
300-DPI SCANNERS								
AGFA SnapScan	15	4	104.0	0.78	21.72	1.23	2.37	7.38
HP ScanJet 5p	6	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
Info Peripherals ImageReader FB	14	5	261.5	0.16	3.74	2.69	0.93	11.54
Mustek Paragon 800 II sp	N/A**	5	111.4	0.63	5.34	1.51	2.21	8.72
Nikon Scantouch 110	10	4	102.3	0.59	4.04	7.39	2.07	43.69
Plustek OpticPro 4800P	8 (tie)	4	74.1	0.33	5.62	4.82	2.98	16.55
600-DPI SCANNERS								
AGFA StudioStar	5	5	71.8	1.10	5.93	9.80	3.10	26.58
AGFA Arcus II	2	5	84.9	0.45	3.66	2.23	2.57	22.87
Epson Expression 636 Pro	7	9	35.1	0.32	1.56	5.68	5.45	58.82
HP ScanJet 4c	11	9	42.9	0.97	6.95	3.07	5.45	5.90
Microtek ScanMaker E6	3 (tie)	8	41.3	1.14	2.92	7.49	5.14	39.95
Microtek ScanMaker III	1	8	79.3	0.47	5.42	2.00	2.63	33.34
Mustek Paragon 1200 sp	N/A**	N/A**	N/A**	N/A**	N/A**	N/A**	N/A**	N/A**
Nikon Scantouch 210	8 (tie)	9	56.4	0.18	2.04	6.29	3.48	56.54
PacificImage ScanAce III	12	8	60.7	0.72	7.95	3.01	3.26	57.27
Ricoh FS2	13	6	306.9	0.70	5.35	0.46	0.02	4.64
UMAX Vista-S12	3 (tie)	8	119.2	0.13	2.77	3.76	1.89	19.22

N/A*—Not applicable. The product was not compatible with our test program.

N/A**—Not applicable. We did not receive a working product in time for our tests.

Again, the default settings as shipped by the vendor were used. Applying a higher gamma correction curve tends to yield a brighter and somewhat more vivid and saturated image on color scans, which may be what an end user would desire for this type of scan. However, the tradeoff that vendors make by setting a higher gamma correction curve as a default was evident as increased noise in the rendered image. Some scanners, such as the UMAX Vista-S12, were able to maintain a relatively low noise level while rendering images that ranked high on our jury tests.

Two scanners in particular were outstanding performers across several tests. The UMAX Vista-S12 tied for the best overall test average. Its good electronic performance correlated well with our jury tests, where it tied for third place. The scan that topped the jury rating was rendered by the Microtek ScanMaker III. While it turned in a less-than-optimal black level under its default settings, its optics were enhanced by its low Ghosting test result and good Uniformity.

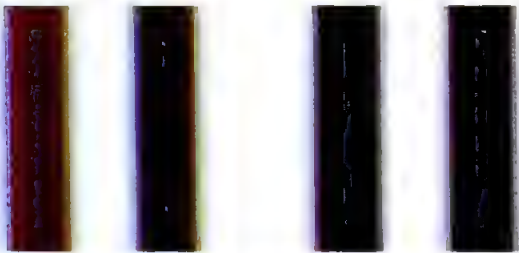
How We Tested

Our tests this year included a suite of inspection tests that evaluate and isolate the scanner's optical system, the precision of the mechanical parts that move the CCD array across the platen (scanner bed), and the noise emitted by the internal circuitry and its effect on the overall scan. To do this we enlisted the assistance of KDY, a Nashua, New Hampshire-based firm specializing in the analysis of high-end scanners and other optical systems that use CCD technology.

We scanned KDY's scanner target at each scanner's highest optical resolution and in the highest color mode, using the default settings. KDY analyzed the results using its ImageXpert software tool, which automates the analysis of image quality at the sub-pixel level. Each scanned target was delivered to KDY as an RGB TIFF file named with a special code number to ensure product anonymity.

In addition to these objective measurements, we used a panel of jurors to rate each scanner's output image quality. Our jurors viewed the images (which are reproduced in the sidebar "Scanner Output Compared") on a color-calibrated monitor and assigned rankings based on how accurately the scanners reproduced the colors of the original image. All images were scanned at the default settings of each scanner and Twain driver; note that in some cases, a higher gamma correction or other tweak to the settings would have produced a different-quality image. For example, the Ricoh FS2 rendered a relatively dark image, but the vendor's defaults were set to render excellent text, which requires sharp blacks.

We used Pentium 200-based Micron Millennia systems, each



Color Registration: Some scanners align colors more accurately. These samples, enlarged five times, show a scan (left) with poor registration (note the yellow and blue "halos"). The other scan shows better registration.



Signal to Noise: Some scanners produce less electronic noise than others. These samples, enlarged five times, show a "dirty" scan with a lot of noise introduced on our solid black target (left) and a cleaner scan.

configured with 32MB EDO RAM, a 512K L2 cache, and an Adaptec AHA-2940U Ultra PCI SCSI controller card using EZ-SCSI 4.0 software and drivers.

The **Resolution** test comprises a series of closely spaced horizontal and vertical lines that must not be broken or touching each other. The results indicate how many line pairs can be resolved per millimeter.

The **Signal-to-Noise** test indicates the amount of electronic noise that a scanner's components generate, sometimes evident in the final scan as speckles, especially in dark areas. The *signal-to-noise ratio* (also known as *dynamic range*) is defined as the *range* divided by the STD (standard deviation) of the *black level*. The range is the tested gray average of the white (a measure of how white the scanner can scan) minus the gray average of the black (how black the scanner can scan). The STD (of the gray values of the black) is a measure of image noise. Our samples on this page show an enlarged view of a noisy scanner versus one with less noise.

The **Color Registration** test indicates the alignment of the CCD array's red, green, and blue planes. Proper alignment is necessary to produce clean edges between colors. Upon close inspection, a rainbowlike halo (technically referred to as a *chromatic aberration*) next to the fine lines is visible on scanners that have poor registration. The results, presented in pixels, describe the maximum distance between any two misaligned planes.

The **Uniformity** test requires the rendering of the average gray level to be the same at various locations across the target. The most uniform scanners achieved a rating below 5 gray levels. Most scanners perform an internal calibration to maintain uniformity. Poor lamp quality or an aged lamp, mechanical misalignment, and even dirt on the scanner's platen can cause nonuniform areas to appear on the output.

Ghosting is the rendering of a faint second image caused by an internal reflection transferred onto the CCD. By scanning any white square or circle and then zooming in closely, you can see the ghost falling outside the bounds of the circle on a scanner that has this problem. Our results are reported in pixels.

The **Black Noise** test measures the number of aberrant pixels (the amount of "noise") a scanner introduces when scanning a 100 percent black target. The results are presented in pixels.

The **Black Level** test indicates how true a black value can be scanned. If you scanned a black sample in RGB mode with a scanner that did poorly on this test, you would get gray instead of jet black.

Special thanks to Yair Kipman and Scott Cole of KDY Inc. (Nashua, NH; 603-598-2500; kdy@acut.com; www.imagexpert.com).—Analysis written by Jeff Mace



Microtek Lab Inc.

ScanMaker E6, ScanMaker III



The two entries from Microtek illustrate why the company has grown to be one of the world's largest scanner manufacturers: Both are value-laden packages that deliver good image quality for their categories. The ScanMaker E6 (\$600 street) is aimed at business and home-office users who need ease of use for a range of scanning tasks. The high-end ScanMaker III (\$1,500 street)—an Editors' Choice in this roundup—delivers the image control and quality that graphics arts users demand.

Setting up both models was simple and straightforward, which was a relief because the scanners came with only a single sheet of installation instructions (users are expected to print out the full documentation from an Acrobat file on the accompanying CD-ROM). Microtek's Twain driver, ScanWizard, includes a bevy of easy-to-understand and use prescan tools, such as an adjustable preview size, the ability to remember a selected preview size, save color curves, and adjust for contrast and gamma scale. It even lets you batch-scan (with or without the \$400 document feeder). Many users won't need to use a dedicated image-editing package to do any more tweaking.

For those who do, the 600-dpi, 30-bit E6 includes an impressive bundle of software.

For image editing, you get Ulead's user-friendly PhotoImpact. For \$200 more, you can upgrade to the full version of Adobe Photoshop (an \$895 retail value). Also included with the E6 is an excellent calibration program, DCR, that uses a Kodak color target to calibrate the scanner relative to your monitor and output device, such as a desktop printer.

The E6 was an average performer on most of our low-level tests. The E6's default setting produced images that were

slightly darker than our original photos, though the images fared notably well with our jury, which judged the output to be third best among reviewed scanners.

As with some other scanners we tested, however, we were concerned about the amount of dust that was sealed inside the unit under the glass. Interpolating images up to the unit's maximum 1,200 dpi revealed dust and other artifacts on the underside of the platen. The E6 did perform very well on our Resolution test, which should make it a good choice for scanning small text.

The ScanMaker III is Microtek's top-of-the-line flatbed scanner positioned for graphics professionals. It includes a full version of Photoshop and a transparency adapter. Like the E6, it boasts a 600-dpi optical resolution, but because it's a 36-bit

scanner it can capture a much fuller range of light and shadow.

The ScanMaker III has a higher gamma built into its firmware than mainstream-oriented scanners, causing it to scan slightly light and clip the highlights when tested in default mode. This may be desirable for preparing color separations that tend to go darker anyway, but it could mean disaster for scans outputting to a desktop printer. Fortunately, ScanWizard's Exposure control lets you switch to a more appropriate printer configuration.

The ScanMaker III's images were sharp and crisp, and the colors correctly saturated and accurate. Its photo images were rated the best of the 17 units tested by our jury. It was near the top in our Resolution test, which translates into clean line-art and OCR scans.

The ScanMaker E6 and ScanMaker III combine good design and an excellent software bundle, and the net result is a superior scan. You won't go wrong with either.—DG and SWG

ScanMaker E6. Street price: \$600. **ScanMaker III.** Street price: \$1,500. Microtek Lab Inc., Redondo, CA; 800-654-4160, 310-297-5000; www.microtekusa.com. Circle 464 on reader service card.

Mustek Inc.

Paragon 600 II sp, Paragon 1200 sp

Scanner giant Mustek offered two entries for this roundup. The Paragon 600 II sp (\$300 street) is a light-duty scanner targeted at the same SOHO market as HP's ScanJet 5p; the Paragon 1200



Mustek's Paragon 600 II sp and Paragon 1200 sp.

If you think you can find a better scanner than an Epson scan this.

THE EPSON® EXPRESSION™ 636 COLOR SCANNER

There's no denying we're making a pretty bold statement about our scanner. But with numbers like this, we can. Because Epson TrueScan™ technology with 36-bit scanning and 600-dpi optical resolution, gives you the power to capture 68.7 billion colors and countless details with incredible clarity. And everything you need

to harness that power is easy to set up and easy to use. So you'll get high-quality images that will turn visual presentations and business documents into bold statements—more quickly and easily than other scanners can. And for a lot less money, too.

But there are other ways we outdo the competition that can't be expressed in numbers. With our exclusive Text Enhancement Technology and Auto Area Segmentation, you can accurately scan both text and graphic images from the same page—even

from colored backgrounds. And you'll get greater versatility with easy, simultaneous hook-up to both PC and Mac platforms. Nobody else can do that. So now that you see what the numbers (amongst other stuff) do for our scanner, wait'll you see what our scanner does for your business. For more information call 1-800-GO-EPSON and ask for operator 3055.

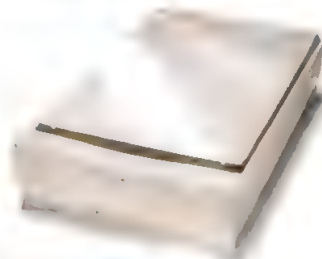
Or visit us at www.epson.com.

COMPARISON CHART

THE EPSON EXPRESSION 636

THE HP SCANJET 4C

Bit Depth	36	30
Colors	68.7 billion	2.0 billion
Maximum Resolution	4800 x 4800	2400 x 2400
Optical DPI	600	600
Grayscale Levels	4,096	1,024
SCAN SPEED-Preview	6 seconds	11 seconds
Color (4x5)	21 seconds	27 seconds
Grayscale	23 seconds	34 seconds
Text OCR	14 seconds	28 seconds



The Expression 636 executive PC bundle comes with Adobe Photoshop® LE, Xerox TextBridge Pro™ '96, NewSoft® Presto! PageManager™ LE and SCSI interface and cable. As well as a competitive edge.

YOU'VE GOT TO SEE IT IN **EPSON** COLOR.

Product comparison based on independent third party testing using a 200 MHz Pentium computer with Windows 95. Scanners were operated in best quality mode using Adobe Photoshop 7.0 with drivers and SCSI cards included in the box. Images were single-pass scanned at 400 dpi. Executive Mac bundle also available with Adobe Photoshop LE, e Paper™ and SCSI cable. Other scanner configurations available. Awards given to the ES 1200C, one in the line of Epson award-winning scanners. Do not scan published material without permission of the copyright holder. EPSON is a registered trademark of Seiko Epson Corp. Expression and TrueScan are trademarks of Epson America, Inc. All other trademarks are the property of their respective owners. © 1996 Epson America, Inc.



CIRCLE 048 ON READER SERVICE CARD

SUMMARY OF FEATURES

Color Flatbed Scanners

■ YES ■ NO

Products listed in review order

	AGFA SnapScan	AGFA StudioStar	AGFA Arcus II	Epson Expression 636 Pro	HP ScanJet 5p	HP ScanJet 4c	Info Peripherals ImageReader FB
Street price	\$330	\$850	\$1,900	\$1,800	\$400	\$900	\$330
Engine manufacturer	AGFA	AGFA	AGFA	Epson	HP	HP	Dextra
Rated maximum scan area (inches)	8.5 x 11.7	8.3 x 14.0	8.3 x 14.0	8.5 x 11.7	8.5 x 11.7	8.5 x 14.0	8.5 x 14.0
Color depth	24-bit	30-bit	36-bit	36-bit	24-bit	30-bit	30-bit
Optical resolution (dpi)	300	600	600	600	300	600	300
Maximum interpolated resolution (dpi)	2,400	2,400	2,400	4,800	1,200	2,400	2,400
Number of gray levels	256	1,024	4,096	256	256	256	256
SCSI adapter included	■	■	■	■	■	■	■
Full-compliant adapter or single-device only	Single	Single	N/A	Full	Full	Full	Full
Options and Software							
List price of transparency adapter	\$199	\$249	Included	\$649	N/A	\$759	\$199
Document feeder capacity (sheets)/price	60, \$249	10, \$279	N/A	30, \$449	N/A	50, \$559	50, \$349
Image-editing software included	Image Pals 2 Go!, Ulead PhotoImpact	Adobe Photoshop LE	Adobe Photoshop	Adobe Photoshop	Corel Photo-Paint Select	Corel Photo-Paint Select	Image Pals 2 Go!
OCR software included	OmniPage LE	OmniPage LE	None	TextBridge Pro, Presto! PageManager LE	OmniPage LE	OmniPage LE	InfoCenter, Recognita 3.5
Twain driver features:							
Preview scan/Portion scan	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Color gamma control	■	■	■	■	■	■	■
Brightness and contrast controls	■	■	■	■	■	■	■
Number of zoom levels	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Crop/Rotate/Invert	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Blur/sharpen filters	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Edge-enhancement filter	■	■	■	■	■	■	■
Descreen/Batch scan	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
RGB-to-CMYK conversion	■	■	■	■	■	■	■
Other software included	AGFA FotoFlavor, FotoSnap, and Copy/Fax/Print	AGFA FotoFlavor, FotoSnap, Foto- Tune Scan, and Copy/Fax/Print	AGFA FotoFlavor and FotoTune Light	Claris Home Page, Kai's Power Tools, NewSoft	PaperPort	PaperPort	InfoCenter con- trol software
Service and Support							
Warranty (parts and labor)	1 year	1 year	1 year	1 year	1 year	1 year	2 years
Toll-free technical support	■	■	■	■	■	■	■
Technical-support hours (eastern time)	9:00–8:00 M–F	9:00–8:00 M–F	9:00–8:00 M–F	6:00–6:00 M–F	8:00 A.M.– 11:00 P.M. M–F, 11:00–6:00 Sat.	8:00 A.M.– 11:00 P.M. M–F, 11:00–6:00 Sat.	11:00–7:30 M–F
Web site	www.agfahome.com	www.agfahome.com	www.agfahome.com	www.epson.com	www.hp.com	www.hp.com	www.infoconnection.com

N/A—Not applicable. The product does not have this feature.

sp (\$500 street price) is a medium-duty scanner targeted at the midrange business user and meant to compete with HP's ScanJet 4c. Both scanners offer acceptable image quality and lower prices than their competition, but Mustek's bundled Twain driver is flawed enough to tarnish the effect.

The Paragon 600 II sp is a 24-bit scanner that offers 300-dpi optical resolution interpolated to 4,800 dpi. Unlike most scanners, the 600 II sp's light remains on as long as the power is on, which is meant to improve scan quality by allowing the light to shine at a constant brightness

(though it eats up more electricity between scans, and the light shines in your eyes whenever you open the cover).

In terms of bundled software, Mustek's Twain driver is, frankly, primitive. To scan a small portion of an image, for instance, you must first define the area, then zoom in on the prescan image to set it. But because it only has one zoom level, you may not be able to view enough of the image to define the area accurately. Worse yet, if you zoom out and then zoom in, the settings are lost. Most other Twain drivers, in contrast, remember the last size and position.

Setting interpolated resolutions was troublesome as well. Selecting 4,800 dpi from the menu consistently resulted in an error message, but when we entered the resolution manually, we were able to scan up to 7,785 dpi—even though Mustek claims no higher than 4,800 dpi for the package. According to Mustek, the problem is specific to Photoshop 3.0.5 (not evident in Photoshop 4.0) and doesn't occur using the bundled image-editing software—Picture Publisher, and Xerox's Textbridge for OCR. On the plus side, the scanner includes full, not light, versions of Picture Publisher and

PC MAGAZINE EDITORS' CHOICE		PC MAGAZINE EDITORS' CHOICE		PC MAGAZINE EDITORS' CHOICE		PC MAGAZINE EDITORS' CHOICE		PC MAGAZINE EDITORS' CHOICE		PC MAGAZINE EDITORS' CHOICE	
Microtek ScanMaker E6	Microtek ScanMaker III	Mustek Paragon 600 II sp	Mustek Paragon 1200 sp	Nikon Scantouch 110	Nikon Scantouch 210	PacificImage ScanAce III	Plustek OpticPro 4800P	Ricoh FS2	UMAX Vista-S12		
\$600	\$1,500	\$300	\$500	\$300	\$730	\$900	\$250	\$2,500	\$500		
Microtek	Microtek	Mustek	Mustek	Nikon	Nikon	PacificImage	Plustek	Ricoh	UMAX		
8.5 x 13.0	8.5 x 13.5	8.5 x 11.7	8.5 x 14.0	8.5 x 11.7	8.5 x 11.7	8.5 x 14.0	8.5 x 11.7	8.3 x 14.0	8.5 x 11.7		
30-bit	36-bit	24-bit	30-bit	24-bit	24-bit	36-bit	24-bit	30-bit	24-bit		
600	600	300	600	300	600	600	300	600	600		
4,800	4,800	4,800	9,600	4,800	9,600	9,600	4,800	1,200	9,600		
256	256	1,024	1,024	256	256	1,024	256	1,024	256		
■	■	■	■	■	■	■	■	■	■		
Full	Full	Single	Single	Single	Single	Single	N/A	N/A	Single		
\$299	Included	\$199	\$299	\$499	\$499	\$379	N/A	Included	\$395		
50, \$400	50, \$400	25, \$199	50, \$299	50, \$595	50, \$595	50, \$329	N/A	30, Included	50, \$495		
Image Pals 2 Go!, Ulead PhotoImpact	Adobe Photoshop	Micrografx Picture Publisher 5.0 and 6.0	Micrografx Picture Publisher 5.0 and 6.0	Adobe Photoshop LE, Nikon Scan	Adobe Photoshop LE, Nikon Scan	Adobe Photoshop Image Pals 2 Go!	Image-In	Choice	Adobe Photoshop or PhotoDeluxe		
OmniPage LE	OmniPage LE	TextBridge	TextBridge	OmniPage LE	OmniPage LE	TextBridge	Recognita	Choice	Presto! PageManager		
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■		
■	■	■	■	■	■	■	■	■	■		
■	■	■	■	■	■	■	■	■	■		
3	3	1	1	Unlimited	Unlimited	Unlimited	None	Unlimited	Unlimited		
■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■		
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■		
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■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■		
■	■	■	■	■	■	■	■	■	■		
None	None	None	None	None	None	None	Action Manager	Choice	ASAP		
1 year	1 year	2 years	2 years	1 year	1 year	2 years	1 year	1 year	1 year		
■	■	■	■	■	■	■	■	■	■		
10:00-8:00 M-F	10:00-8:00 M-F	11:00-8:00 M-F	11:00-8:00 M-F	8:30-4:45 M-F	8:30-4:45 M-F	8:00-5:00 M-F	11:30-8:30 M-F	8:00-5:00 M-F	9:00-8:00 M-F		
www .microtekusa .com	www .microtekusa .com	www.mustek .com	www.mustek .com	www.nikon.com	www.nikon.com	www.scanace .com	www .plustekusa.com	www.ricoh.com	www.umax.com		

Textbridge for Windows 3.x, Windows 95, and Windows NT.

The units Mustek supplied for testing yielded anomalous (and unusable) results on our tests, and we could not get replacement units in time for our jury tests. We were able to purchase a replacement for the 600 II sp, however, and include its low-level results in our performance chart. Its color scans were a little dark at the default settings but were quite good otherwise, with appropriate color and shading.

For more demanding tasks, the Paragon 1200 sp offers 600-dpi optical

resolution interpolated to 9,600 dpi, with 30-bit color depth. Like the 600 II sp, the 1200 sp's light shines continuously. The Twain driver allows for interpolated resolution as high as 9,600 dpi, but, as with the 600 II sp, we were unable to select 9,600 or 4,800 dpi using Photoshop 3.0.5. To our surprise, however, the driver let us enter manually interpolated resolutions as high as 8,300 dpi. Image quality for the scanner supplied by Mustek was quite acceptable with appropriate color and shading, though similarly dark at the default settings.

All in all, it is hard to recommend ei-

ther of these models unreservedly. Their relatively low prices position them among the least expensive choices in their respective classes, and they are among the few scanners we tested with a two-year warranty. But the Twain drivers are problematic at best. You will need to weigh the price savings carefully against the frustration you might experience working with somewhat unfriendly drivers.—MDS

Paragon 600 II sp. Street price: \$300. **Paragon 1200 sp.** Street price: \$500. Mustek Inc., Irvine, CA; 800-468-7835, 714-247-1300; www.mustek.com. Circle 465 on reader service card.

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— PC WORLD, December, 1996 —

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HARDWARE
Color Scanners

Nikon Inc.

Scantouch 110, Scantouch 210

Known primarily for its line of professional and semiprofessional 35-mm SLR cameras, Nikon also manufactures a wide range of flatbed and film scanners for the SOHO, business, and professional graphics markets. The Scantouch 110 (\$300 street) is a handsome, simple-to-use flatbed scanner targeted at the small-business/home user, while the 600-dpi, 24-bit Scantouch 210 (\$730 street) is a more robust model designed for higher-volume business and professional graphics applications. Both scanners are solid if somewhat unexciting performers.

Nikon uses the same Twain driver interface for both scanners. It is designed to interface with the bundled Photoshop LE, and oddly, there's no provision for manual color calibration (the firmware does it on power-up). It does, however, let users set monitor gamma by eyeballing several color targets. While this approach doesn't affect scan color or contrast, it can correlate what you see on the monitor more closely to what is actually scanned. Both units also include Caere's OmniPage LE OCR software.

Nikon's Twain driver provides the usual set of prescan tools such as crop, rotate, zoom, flip, contrast, color balance, sharpen, balance, and gamma curve. Users may also choose either bilinear or nearest-neighbor interpolation. Setting output size, resolution, and scale is simple. One useful feature is the ability to zoom into the prescan, so you can examine details before making the scan.

The Scantouch 110 is a 24-bit device with 300-dpi optical resolution interpolated to 4,800 dpi. Setting up the 110 is simple: Unscrew the built-in lock knob, attach the SCSI cable, boot up, and install Nikon's software. We were scanning in less than 10 minutes. Had we encountered any problems, Nikon's well written, illustrated, and indexed documentation would have helped us pinpoint and solve them in short order.

There's even a separate booklet on how to scan, what the various tools are, how they work, and how to achieve the best scans.

The Scantouch 110 was an average performer on our low-level tests, and its images placed mid-pack in our jury analysis. Images showed good detail for a 300-dpi scanner, especially in shadow areas, and colors were accurate. Using the default settings, scanned photos came across as somewhat flat, however, lacking snap. Changing the gamma settings could yield more pleasing results.

Like the 110, the Scantouch 210 is easy to install, set up, and run, and its documentation is just as excellent as (or identical to) the 110's. The 210 has a 600-dpi optical resolution interpolated to 9,600 dpi.

Colors from the 210 were accurate, consistent, and properly saturated, but again, tended to be slightly on the dull side. Image edges were sharp, and pixelization was minimal. It, too, landed in the middle of the pack with our jury. The 210 was the best performer among the reviewed scanners on our low-level Resolution test, which bodes well for line art and OCR tasks, and its score was among the best on the Color Registration test. Its Black Noise and Black Level test results were disappointing, however, revealing less-than-perfect blacks at the scanner's default settings.

Both Nikons, however, are decent scanners that produce acceptable quality images for most personal and business applications.—*DC and SWG*

Scantouch 110. Street price: \$300. **Scantouch 210.** Street price: \$730. Nikon Inc., Electronic Imaging Dept., Melville, NY: 800-526-4566, 516-547-4200; www.nikonusa.com. Circle 466 on reader service card.



Nikon's Scantouch 110 and Scantouch 210.

PacificImage Electronics Co.

ScanAce III

Built to go up against HP's ScanJet 4c, the ScanAce III from PacificImage (\$900 street) packs the power of a professional graphics or high-end business scanner. And while it doesn't win on every count, it offers some attractive advantages.

This 36-bit unit boasts an optical resolution of 600 dpi interpolated to 9,600. Setting up the ScanAce was simple; pluses include a dial switch for the SCSI ID settings and even a captive bolt to lock the scan head for shipment. On the downside, the scanner does not offer internal termination for the SCSI interface, though the kit includes a termination plug.

The ScanAce comes with PacificImage's CyberView software, its Twain-compatible scanning utility. Besides the typical adjustments for brightness, contrast, and color balance, the driver offers highlight and shadow controls and a curve utility for gamma correction that lets you adjust multiple color channels at once or each one individually.

CyberView contains some unusual and welcome features: It can scan multiple regions of the same document in the same scan, and scan both text and graphics in a single region. The utility closes at the end of each scan if you use the Twain File Access command from another application, and the settings will remain set for the next scan. If you need to touch up scanned images, PacificImage bundles Ulead's Image Pals 2 Go! software, an easy-to-use package that delivers a wide range of features. The bundle also includes Xerox's TextBridge Classic for OCR tasks.

Image quality was good though not spectacular at the default settings: The ScanAce image placed twelfth in our jury evaluation. It produced accurate color scans quickly, and color photo scans improved under interpolation. The ScanAce offers a Quality setting that slows the scan head to provide more precise positioning, though PacificImage says that the Normal setting is sufficient for most applications.

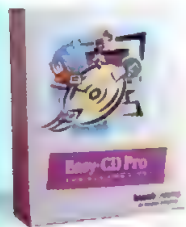
Performance on our low-level tests was mixed. The

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When a Flatbed Scanner Is Too Much

Do you need a flatbed scanner? If all you want is a sheet-fed page scanner that can handle an occasional color image, or if all you'll ever need to scan is family photos, there are some interesting alternatives.

Logitech's **PageScan Color Pro with ADF** (\$350 street) is a personal sheet-fed scanner that delivers monochrome and color capabilities. It sports a detachable head for scanning bulky images and book pages, plus a 10-page document feeder. Acceptable image quality as well as versatility and ease of use make it worth a look.

The unit's small size (5 by 12 by 4 inches) and light weight (less than 5 pounds) makes it appropriate for occasional use as a portable. The 24-bit scanner has a maximum optical resolution of 400 dpi, interpolated to 1,600 dpi. Setup couldn't have been simpler: We were able to attach the head to the base and hook the unit to the system via a parallel-port cable in under a minute.

The bundle includes scanning software, Adobe PhotoDeluxe, Papermaster SE for file management, and Xerox TextBridge for OCR. A comprehensive multimedia tutorial and extensive online help files come on CD-ROM; hard-copy documentation consists of a small booklet of limited detail.

Using the PageScan is easy: Insert the original in the scanner and the unit automatically pops up the scan utility's Control Center, where you select scan type. Control Center is not as robust as the scanning applets included with the flatbed units we tested. There are no prescan options, for example, and to accept a prescan you must select the less-than-obvious "No More Pages" button. The scan utility lets you do rudimentary image editing such as cropping and rotating, as well as adjusting brightness and contrast. In case you need to fine-tune your image further, Adobe PhotoDeluxe—one of the easier-to-use image-editing packages—is only a click away.

The PageScan Color's breeding as a text-page scanner first and color scanner second was apparent. The unit performed best when scanning text. Our color test image (scanned at 400 dpi) came out rather washed out and dull, with somewhat inaccurate colors. Still, if you want a compact page scanner for OCR but worry that you might wish for a color scanner now and again, the PageScan Color is worth a look.

Storm Technology's **EasyPhoto Reader** (\$200 street) aims to do just one



Color output from the 400-dpi PageScan Color Pro with ADF looked dull and washed out (left). The 200-dpi EasyPhoto Reader produced rich, accurate color scans.

thing but do it well: scanning photos as large as 5 by 7 inches into your computer. Targeted to the general consumer with a focus on families, the 24-bit, 200-dpi EasyPhoto offers more features than you might expect. It produced better-than-average images, with especially good color.

The compact unit (6 by 5 by 3.5 inches) looks more like a toy than a scanner, a feeling reinforced by its big green scan button on top. A detachable head lets you scan color images from magazines and books. It attaches easily to your PC's parallel port; the documentation is comprehensive.

The EasyPhoto Organizing Software, scan software that's built around fun and intuitive photo-gallery and filmstrip metaphors, lets you add an image from the scanner, CD-ROM, or hard disk. It takes about 10 seconds for the EasyPhoto to scan a 4- by 6-inch photo at 133 dpi, and the software lets you adjust the color, contrast, and brightness. The package also contains EasyPhoto DesignWorks, a program for creating photo-filled documents, catalogs, flyers, and the like.

Image quality for the EasyPhoto Reader was quite good. Colors, in particular, were accurate and rich. The relatively low 200-dpi resolution produced more jagged edges than we saw from the flatbed units, though the software interpolation helped reduce the effect. For family fun—especially for those with color ink jet printers—the

EasyPhoto Reader is a neat addition.—*Toni Kistner*

PageScan Color Pro with ADF. Street price: \$350. Logitech Inc., Fremont, CA; 800-231-7717, 510-795-8500; www.logitech.com. *Circle 471 on reader service card.*

EasyPhoto Reader. Street price: \$200. Storm Technology Inc., Sunnyvale, CA; 888-438-3279, 415-691-6600; www.easypphoto.com/storm. *Circle 472 on reader service card.*



Logitech's PageScan Color Pro with ADF, and Storm Technology's Easy-Photo Reader.



PROJECTING A BETTER IMAGE: VOLUME ONE

The mind is a wonderful thing.

*It starts working the minute you're born & never
stops until you get up to speak in public.*

—Roscoe Drummond

What if my mind goes blank in the middle of my speech?

What if my audience thinks I'm boring?

What if my voice trembles and I

start stumbling over my words?

That nervous fear of speaking before a group is not only common, it's completely natural.

Even people who conduct

seminars on public speaking get

nervous. Yet just because

your knees are shaky

doesn't mean your

presentation has

to be, as well.

Just by using

the suggestions

outlined here,

you'll be better

able to control

your nervousness

and become a more

effective public speaker.



You're giving another speech. Is that your audience applauding? Or the sound of your knees knocking?

Feeling at ease with an audience of 5 or 500. Nervousness makes your body act as if it were preparing for a strenuous physical activity. The adrenaline that's released makes your heart beat faster, causing you to take in more oxygen. But more oxygen just makes you feel more nervous, so your body releases more adrenaline. Even though you'll only be speaking, you now have enough energy to run a marathon. Somehow, you need to control this physical process. Here are 3 simple ways to help you do that.



To relieve tension, pull up on the bottom of your chair for five seconds. Repeat often.



Pressing your palms together tightly also relieves tension. You can even do it during your presentation.



Force yourself to breathe slowly and deeply. This slows a rapid heart rate caused by too much adrenaline.

10 WORST HUMAN FEARS IN THE U.S.

1. Speaking before a group
2. Heights
3. Insects & bugs
4. Financial problems
5. Deep water
6. Sickness
7. Death
8. Flying
9. Loneliness
10. Dogs

Source: The People's Almanac
Presents The Book of Lists

YOUR MIND IS THE MOST POWERFUL WEAPON you have for controlling fear and nervousness. In fact, experienced speakers have ways to actually outsmart their nervousness so that it doesn't get the best of them. With the following tricks, you can do it, too.

Practice makes perfect.

Mark Twain said it usually took him three weeks to write a really good impromptu speech. We have no doubt that he spent much of his time practicing.



All the more reason to start rehearsing as many days before your speech as you can. Also, be sure to practice in the room where you'll be speaking. Doing both of these will make you decidedly more confident and persuasive.

Make friends, not enemies.

If possible, try mingling with your audience before



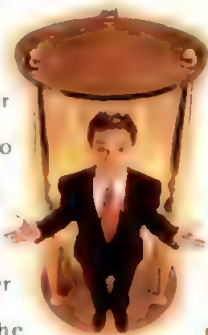
you give a speech.

It sounds silly, but it really can have a wondrous effect. When you finally do stand in front of your audience to

speak, you will no longer see them as your enemy.

Memorize the beginning.

People are often most nervous at the start of their presentations. So simply memorize the first couple of minutes. After you get past the



introduction and into a good cadence, you may be surprised to discover that your stage fright will have all but disappeared.

Redirect your thoughts.

Instead of thinking about audiences as a reason to be nervous, think of them as a source of comfort. Your audience is there to

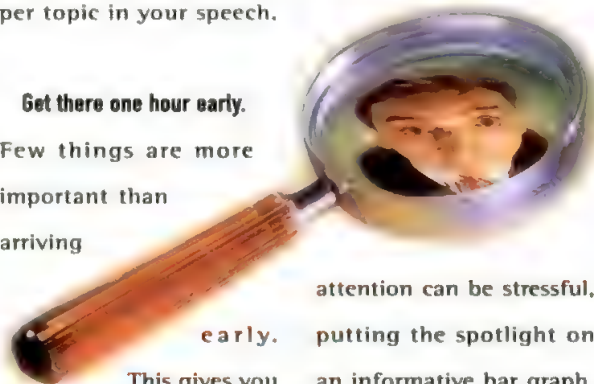
hear what you have to say. So relax. After all, to everyone listening to you speak, you're the expert.

Make cheat sheets.

To avoid worrying about covering all your points, and to help you present those points in the order you intended, write the first few words for each subject on a 3x5 index card. Use one card per topic in your speech.

Get there one hour early.

Few things are more important than arriving



early. This gives you the chance to rehearse in the same environment in

which you will actually be giving your presentation. It also means that you'll be able to practice with the equipment you will be using, and to make sure that everything is set up and in working order.

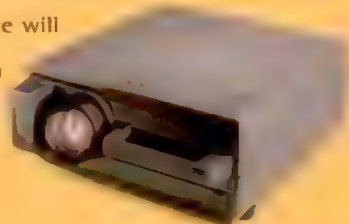
Use presentation aids.

Visual aids are more than a way to help get points across. They can also help control your nervousness. Since being the center of

attention can be stressful, putting the spotlight on an informative bar graph, chart or model will often alleviate the pressure.

Feeling at ease with your LCD projector. One thing you should never have to worry about is how your video equipment will perform. Which is where our VPL-V500Q portable LCD projector comes in. It offers the bright, uniform images you need for a professional presentation. With no annoying hot spots or darkened corners. Everywhere you look, your image will be both bright and true. To learn even more, turn the page.

SONY



A brief presentation on our LCD projectors.



VPL-V500Q

VPL-V800Q

VPL-W400Q

Including the VPL-V500Q, there are three LCD projectors in our LCD family.

Call us at the number below to determine which is best for you.

Optional Accessories



PSS-500 Ceiling Mount



VLC-500 Soft Case

Standard Accessories



RM-PJM500

Wireless Remote Commander® Unit



RM-PJ20

Wireless Mouse Receiver

With the advantages listed here, our VPL-V500Q LCD projector can turn any meeting room, training room or classroom into a multimedia presentation forum.

1. A Brilliant Image. Light output of 500 ANSI lumens (VPL-V500Q model only) offers spectacular brightness.

Even on large screens in rooms with ambient light.

2. A Consistent Image. Our newly developed optical unit and 250W DC drive metal halide lamp combine to provide uniform brightness and color from corner to corner.

3. A Portable Image. Since the VPL-V500Q is compact and light, it travels easily for out-of-town presentations.

4. An Image That's Easy to Project. Just hook up a compatible signal source with the supplied cable (and adapter for Macintosh® computers). From there, the joystick-type

Remote Commander® unit and on-screen display menus make any final setup and adjustments quick and simple.

5. An Image We Stand Behind. All our LCD projectors have a 3-year/3-year warranty on parts and labor, as well as a 90-day lamp warranty. (See actual warranty for details.)

Our wireless Remote Commander unit and wireless mouse receiver are standard (VPL-V500Q). Soft case, hard case, ceiling mount and replacement lamp are optional.

To learn more, or to purchase a VPL-V500Q from any of our select Sony resellers, call 1-800-472-7669, ext. LCD.



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VPL-V500Q Specifications

Projection system:

3 LCD panels, 1 lens,
projection 1.3-inch
p-Si TFT LCD panel,

921,600 pixels
(307,200 pixels x 3 panels)

Projection lens:

1.6 times zoom lens f50
to 80 mm/F2.5 to 3.1

Lamp:

250W metal halide lamp

Screen coverage:

40 to 300 inch

Light output:

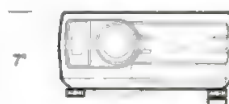
ANSI: 500lm

Weight:

22 lbs.

Dimensions:

VPL-V500Q



14 1/2"



16 5/8"

mm = 368(W) x 176(H) x 420(D)

inches = 14 1/2(W) x 7 (H) x 16 5/8(D)

SONY



ScanAce registered a good Resolution score; indeed, it was able to resolve our line-art test target to an excellent 406 lpi horizontally and 361 lpi vertically. But it trailed competing units on our Signal-to-Noise, Uniformity, and Black Level tests.

The only testing hitch we encountered under Windows 95 was the choice of Twain interface. Performance was noticeably slower under the 32-bit Twain setting. According to PacificImage, this is to be expected, because the CyberView software is a 16-bit application. Switching to the 16-bit Twain setting should speed things up.

The ScanAce offers professional-quality scanning in a package that is easy to use and relatively affordable. Its CyberView applet provides some convenient features not found on the competing HP unit, and the two-year warranty provides peace of mind. If you need better image quality than what an entry-level scanner can give you, the ScanAce III is a suitable midrange choice.—*Alfred Poor*

ScanAce III. Street price: \$900. Pacific-Image Electronics Co., Torrance, CA; 800-909-9996, 310-214-5281; www.scanace.com. Circle 467 on reader service card.

Plustek USA Inc.

OpticPro 4800P

Plustek USA's OpticPro 4800P stands apart from the rest of the scanners we tested in two ways. At a list price of \$299 (\$250 street) it's the least expensive unit. And unlike the rest of the pack, it attaches right to the system's EPP parallel port instead of requiring a SCSI card.

As a matter of fact, the OpticPro is a bit out of place in this roundup: Its price and configuration place it more in competition with sheet-fed scanners such as Logitech's PageScan Color Pro (profiled in

the sidebar "When a Flatbed Scanner Is Too Much" on the previous page), the UMAX PageOffice Color, and the Microtek PageScan Color. But because it's a flatbed, the scanner is suited for jobs that sheetfeds can't handle, such as scanning from books. Plustek bundles Action Manager document-management software, Recognita OCR software, and Image-In for image editing.

Hooking up and configuring the OpticPro was a snap, partly because of the parallel-port connection. In its documentation, however, Plustek warns that the Action Manager access button (located on the outside of the unit for launching the software) might not work when using a pass-through to a printer. And in keeping with its target market, the scanner includes a no-frills Twain driver that allows no color correction save choosing your monitor gamma.



The OpticPro ranked in the middle of the pack in color-image quality; scans at the default settings were overly dark with a strong pink cast. We also saw gaps in its tonal range in the individual R, G, and B channels. With the exception of its performance on the Ghosting test, though, it fared well against its 300-dpi competition.

If you're looking for a low-cost flatbed alternative to sheet-fed models, or if you want a passable color scanner but don't want to open your PC to install a SCSI card, the OpticPro 4800P certainly fills the bill. But if you're looking for higher-quality imaging at a reasonable price, other affordable scanners in this roundup may prove to be a better solution.—*LG*

OpticPro 4800P. List price: \$250. Plustek USA Inc., Sunnyvale, CA; 800-685-8088, 408-745-7111; fax, 408-745-7562; www.plustekusa.com. Circle 468 on reader service card.

Ricoh Corp.

Ricoh FS2

As you might guess from its hefty \$2,500 street price, Ricoh's FS2 is in a different league from most other scanners tested here. The included document feeder and transparency adapter account for part of the cost, but much of it is the result of designing an industrial-strength scanner. Although the FS2 can take on general-purpose black-and-white, gray-scale, and color scanning, it is best appreciated by users who require high-volume document capture and management, as in a law or medical office, for instance.

The FS2 is a 30-bit, 600-dpi resolution unit, with interpolation to 2,400 dpi. More intriguing, however, is Ricoh's promise that the unit will produce 250,000 scans, and that the 250,000th will match the quality of scans from the first 1,000. Installing either the document feeder or transparency adapter is uneventful, involving little more than detaching the cover,

sliding the feeder or transparency unit into place, and plugging the attached cable into the rear of the scanner. Rated speed for the 30-sheet document feeder and accompanying capture software is an admirable 7 to 10 pages per minute at 300 dpi.

Ricoh lets you choose from an abundance of bundled software, including two OCR programs (Caere's OmniPage Professional and Adobe's Acrobat Capture), two document-capture and document-management programs (Recollect Gold, from Mindworks, and LaserFiche, from Compulink), a forms processing package (TELEform, from Cardiff), and even a development tool for building your own document-imaging system (ImageBASIC Electronic File

HARDWARE

Color Scanners



Cabinet, from Diamond Head Software). In addition, the package bundles Picture Publisher, Isis drivers (a common standard for document-management programs), and both 16-bit and 32-bit Twain drivers. Because of a mismatch with the new firmware, however, the drivers that we tested worked only for color scans, but the company expects to update the drivers by the time you read this story.

The Twain drivers are easy enough to use, with the usual controls for resolution, setting the scanning area, and so on. But if you adjust brightness and contrast after a prescan, the result won't show up until the following prescan. This is annoying, considering that each prescan of an 8-by-10 image takes about 25 seconds.

The FS2 image ranked only thirteenth on our jury tests for the color image; using the default settings produced a scan far darker than the original, with detail lost in shadow areas. Tweaking the settings could yield more true-to-life results, and if you discount the shift to darker colors, the quality is otherwise excellent. For text and monochrome line-art scanning, the default settings should prove ideal.

On the low-level performance tests, the Ricoh FS2 landed among products in the top tier on the Signal-to-Noise and Ghosting tests. The unit performed fairly well with our line-art test target, resolving 350 lpi horizontally and 400 lpi vertically.

Although Ricoh office-equipment dealers sell the FS2 directly, until now it has been marketed primarily through VARs and system integrators. If you don't buy the package directly from a Ricoh dealer, you are likely to get different software and may perhaps have the

option to buy it without either the transparency unit, document feeder, or both. Whatever the source, however, the FS2 is a strong candidate if you're looking for a heavy-duty scanner aimed at document-management applications that can also handle color with marked aplomb.—MDS

Ricoh FS2. Street price: \$2,500. Ricoh Corp., San Jose, CA; 800-955-3453, 408-432-8800; www.ricoh.com. Circle 469 on reader service card.

UMAX Technologies Inc.

Vista-S12



From UMAX's wide lineup of color scanners, we tested the Vista-S12 (\$500 street), a modestly priced scanner appropriate for business and graphics users. The UMAX yielded excellent performance on both our jury tests and our low-level tests. Its ability to deliver the right combination of ease of use and robust control led us to select it as an Editors' Choice in this roundup.



The Vista delivers 600-dpi optical resolution and has a claimed interpolated resolution of 9,600 dpi, though in testing we weren't able to increase it beyond 4,800 dpi. And although it is a 24-bit device, UMAX claims that by boosting the analog gamma curve in the firmware, the unit achieves 33-bit performance. The bundle we reviewed delivers Presto! PageManager OCR software and Adobe's PhotoDeluxe image-editing package. For \$100

more, you can step up to Photoshop LE; and for just \$200 more you can upgrade to the full \$895 version of Photoshop 4.0.

The UMAX Twain driver is a powerful, sophisticated piece of software, yet still approachable for novices. You can set it to do an automatic self-calibration when the driver loads, as well as input the profile for the printer or type of screen you'll be outputting to. UMAX's Twain driver broke away from the pack on two important counts: It was one of the few models capable of scanning in either RGB or CYMK color mode (via an RGB-to-CMYK conversion) for professional graphics applications, and it was the only model with an HSB (hue-saturation-brightness) adjustment.

The Vista performed quite well on our low-level tests, yielding strong Color Registration and Uniformity scores. Its images were jury favorites, ranking third overall. Colors were accurate and rich, and it retained good detail in shadow areas, though the focus tended to be soft.

The Vista's Resolution test score was also top-tier, a showing that bodes well for OCR scanings. Indeed, during subjective testing, this scanner really shone when interpolating black-and-white type: Sharpness and clarity of 8-point type improved at 2,400 dpi, but at 4,800 dpi it looked even better, with virtually no aliasing or pixilation evident. It did only a fair job, however, of interpolating the color photo at 1,200 dpi: The image remained soft and the colors were slightly posterized.

The Vista-S12 did an admirable job on our low-level tests, holding its own against devices costing far more. It's a good value for business and graphics users who want an all-around scanner for text and photos, and it is affordable enough for home and SOHO users as well.—DG and SWG □

Vista-S12. Street price: With PhotoDeluxe, \$500; with Photoshop LE, \$600; with full version of Photoshop, \$700. UMAX Technologies Inc., Fremont, CA; 800-562-0311; 510-651-4000; www.umax.com. Circle 470 on reader service card.

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Kodak DC-40 Digital Camera



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EPSON PhotoPC 500 Digital Camera

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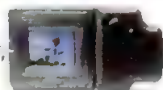
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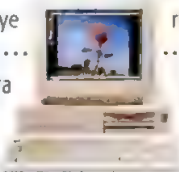


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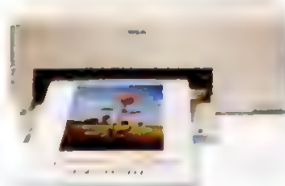
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OUT OF THE DARKROOM

Low-cost digital cameras are fine for screen images, but not for film-quality images. Here are five midrange digital cameras worthy of the print professional.

By Daniel Grotta and Sally Wiener Grotta

THERE'S A NEW CLASS OF DIGITAL CAMERAS EMERGING, AND IT'S GUNNING FOR THE HEART OF the professional photography market. Better than the point-and-shoot devices aimed at mainstream users and more versatile than the tripod-mounted PC-tethered studio cameras, the new midrange digital cameras let professional and advanced amateur photographers capture film-quality digital images in the field. Built around popular professional camera bodies from such makers as Nikon and Canon, this breed is familiar to professional photographers. But there is



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Midrange Digital Cameras

one important difference between traditional film cameras and the new crop of midrange digital cameras: Photographers who use digital cameras don't have to spend hours locked in a darkroom at the end of the day to see their results.

The latest crop of entry-level home and business digital cameras we reviewed ("Heave-Ho, Silver!", January 7, 1997) are ever more affordable, easy to use, and great for capturing images suitable for newsletters and Web sites. But they lack the resolution for producing photographic-quality prints that are 5 by 7 inches or larger. Nor do these point-and-shoot cameras incorporate such advanced features as manual control over f-stops and shutter speeds or interchangeable lenses. Professionals who needed film-quality prints for catalog and magazine layouts could opt for a digital studio camera, but these units require you to be tethered to a PC and power source, making them inconvenient when taken along for location shoots.

BIRTH OF A CATEGORY

If your work demands photographs of uncompromising image quality and versatility, you might want to consider a midrange, real-time, portable digital device. More system than camera, this unit is meant to replace your Nikon, Canon, or Minolta SLR and yet utilize traditional legacy lenses, strobes, and accessories. It uses a larger high-density CCD (charge-coupled device)—the photosensitive semiconductor chip that captures an image—than its entry-level counterpart,

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which translates into a significant jump in price. But the payoff in larger, better-quality images and precision control may well be worth the cost.

The midrange category of digital cameras—\$3,500 to \$10,000—didn't exist two years ago. Minolta was the first company to introduce a sub-\$10,000 model incorporating higher resolution, manual and automatic operation, and interchangeable lenses.

REVIEW CRITERIA

While the field is far from crowded, there are now about a half-dozen cameras that possess at least five of the following seven attributes that we used as criteria for inclusion in this review:

- a portable, battery-powered camera;
- a CCD or CCDs totaling at least 1 million pixels;
- interchangeable lenses;
- manual f-stops and shutter speeds;
- either removable storage media or a SCSI interface;
- a PC flash connector for attaching external strobe lights;
- a street price under \$10,000 for the body.

We tested the AGFA ActionCam (\$5,500 street), the Kodak Professional DCS 410 (\$7,000 list), the Fuji Fujix DS-505A (\$9,995 list), the Minolta RD-175 (\$5,000 street), and the Polaroid PDC-2000/40 (\$3,300 street). Except for documentation, software bundle, and price, the AGFA and Minolta models are identical; Minolta manufactures the camera and both Minolta and AGFA market it. Similarly, the Nikon sells the E2n, which is identical to the Fuji camera; we were unable to get the Nikon in time for testing. As a counterpoint to our midrange units, we included one high-end model: the top-of-the-line, \$27,995 Kodak Professional DCS 460.

WHY SO EXPENSIVE?

CCD fabrication is still a black art. As chips become larger and hold an ever-increasing number of sampling points (or *pixels*), the manufacturing quality-control rejection rate rises proportionally, as does the cost. A pea-size, $\frac{3}{16}$ -inch-square CCD with 250,000 pixels, suitable for a \$500 entry-level camera, costs about \$50 or less in quantities of 1,000. But the cost of a fingernail-size, $\frac{1}{2}$ -inch CCD with 1.5 million pixels rises dramatically to about \$1,000 in quantities of 100. A postage stamp-size CCD with 6 million pixels could cost a whopping \$18,000. Add to this the price of a high-quality pro or semipro camera and lens, expensive low-power RAM, removable media, R & D expenses, and a current sales volume counted only in the thousands and you've got the reason why the cost of these models is so staggering.

Highlights:

Changing the Face of Professional Photography

While entry-level digital cameras continue to court the home and business markets, the new crop of midrange models is going after the professional market—newspaper, catalog, and product photography. With bigger CCDs, higher resolution, and familiar SLR front ends, lenses, and accessories, this category presents the first real threat to traditional film photography.

RESOLUTION AND IMAGE QUALITY The midrange models we tested can produce im-

ages up to 8 by 10 in better detail and more accurate color than ever before. But the image quality produced by traditional film is still hard to beat: Film has an equivalent resolution of either 18 million or 100 million, while the best digital camera tops out at only 18 million. This means that you still need a traditional outfit for enlarging images.

SPEED AND EFFICIENCY One of the most compelling reasons to go digital is speed. In a matter of minutes, an exclusive photo can be

transmitted via notebook and modem to a news desk and then right onto the printing press plate. And with no darkroom downtime, photojournalists can spend more time snapping news shots.

REAL-WORLD PRICES Rightfully, midrange models continue to suffer a sticker-shock stigma caused by the high cost of CCDs and low market share. However, the gap between the midrange class and 35-mm pro cameras shows signs of narrowing.

Over the past three years, digital photography has made major inroads in areas once dominated by professional 35-mm film cameras, particularly photojournalism. According to David Rocha, senior photo-technology specialist for the Associated Press, almost all of the top 50 American newspapers now use midrange or high-end digital cameras. And according to a Newspaper Association of America survey, a third of the country's dailies (about 535 newspapers) plan to buy digital cameras within the next five years.

Part of the reason is speed: On-the-spot news pictures can be instantly transmitted to the photo editor via laptop and modem, and images can speed through editing and onto printing-press plates in a matter of minutes. What's more, photojournalists typically spend a third of their working day in the darkroom processing film; going digital frees them up to take many more pictures. But the big push is prompted by the bottom line: saving money. Over the long haul, publishers will cut costs significantly by eliminating film, developing, and the disposal of environment-polluting chemicals.

Although market penetration has been slow, pro and semipro digital cameras are on the verge of impacting traditional photography as well. They're being used for portraiture; annual reports; product shots; catalog production; yearbooks; industrial, scientific, and medical photography; and more.

WAR OF THE PIXELS

Currently, most professional photographers are engaged in a spirited, sometimes acrimonious debate on whether or not they should use digital cameras. In such areas as catalog and product photography, the war is all but over. The considerable long-term benefits of improved efficiency, greater speed, and lower production costs are argument enough.

Nevertheless, film still produces better resolution and image quality than digital cameras. This seems to be the primary inhibitor against digital photography's rapid acceptance (apart from the initial expense).

Our Contributors: DANIEL GROTTA and SALLY WIENER GROTTA are contributing editors of *PC Magazine* and the authors of *Digital Imaging for Visual Artists* (McGraw-Hill). JAMIE M. BSALES was the associate editor in charge of this story, and JEFF MACE was the project leader.

Editors' Choice

• No winners, two runners-up



Midrange digital cameras are still experiencing growing pains. None of the five cameras we reviewed are perfect—especially when compared with the near-

flawless, \$27,995 Kodak Professional DCS 460, which we included as a yardstick. So we can't yet recommend a hands-down Editor's Choice winner. Still, you may be willing to look past imperfections if your needs are pressing.

The identical AGFA ActionCam (\$5,500 street) and Minolta RD-175 (\$5,000) merit honorable mention. Both deliver crisp, detailed images (at an admirable resolution of 1,528-by-1,166) with good color and near-perfect exposure. The Minolta lenses are quite good and tend to be significantly less expensive than Nikon's or Canon's. Unfortunately, both cameras include disappointing software.

Trying to get the driver to work with Adobe Photoshop was impossible. Also, you must acquire the images from the memory card

one at a time. AGFA and Minolta must improve the Twain driver and Windows interface before we can recommend the products without qualification.

Also worth considering: The Kodak Professional DCS 410 (\$7,000 list) delivers fairly good resolution (1,525-by-1,012), but the images in our testing lacked snap and the colors shifted toward magenta.

The Fujix DS-505A (\$9,995 list) is a bit chunkier than the other cameras. Its 1,280-by-1,000 images are good for that resolution, but enlarging them to 8 by 10 inches would start to show the inherent limitations of the low resolution. The Polaroid PDC-2000/40, while cheaper than the others in this review (\$3,300

street), lacks the removable media, lens selection, and manual controls professional photographers would demand.



The AGFA ActionCam, one of the two honorable mentions.

Whether you're counting the individual grains of silver halide crystals or calculating the color, hue, brightness, and intensity of each granule, a single frame of fine-grain 35-mm transparency film has an equivalent resolution of either 18 million or 100 million pixels. By contrast, the best real-time digital camera, the DCS 460, produces a file size no larger than 18 million pixels. This means that 35-mm negatives or transparencies can be blown up to wall-size prints (although they might appear a bit grainy). With film, you can blow up small, selected portions of the picture. Traditional prints are also much easier to store.

In its present state of development, digital photography is somewhat limited. Even though the five cameras we tested can produce 5- by 7-inch or 8- by 10-inch images (and with the DCS 460, 11- by 14-inch images), they don't contain enough

data to blow up or enlarge small portions of an image. And as digital data, files must be stored on a disk drive, tape, Photo CD, or CD-ROM.

THE DIGITAL DIFFERENCE

Shooting digitally is very similar to using film, although digital cameras are bulkier and require more battery power than their 35-mm counterparts. Both systems demand the same attention to f-stops, shutter speeds, and good lighting and composition. But instead of loading and rewinding film cartridges, you swap PC memory cards or disk drives.

Of course, there are minor differences that force the digital photographer to adjust to the new technology. One difference involves correlating the viewfinder to the lens. Because the physical size of a CCD is much smaller than 35-mm film (which is 1 by 1.5 inches), the camera must either mask or frame off the noncapture areas in the viewfinder (as with the RD-175) or use a condenser lens to magnify the image (as with the DS-505A). There are advantages

ANALYZING THE OUTPUT

Features and usability are fine review fodder, but the true-measuring stick of a camera's quality is its output. On these pages, we show images from the five midrange cameras reviewed, plus some from an entry-level camera (below) and a high-end camera (below right) for comparison.

We specially designed our strobe-lit still life to create a number of challenges. Specular highlights and tiny details make jewelry an often difficult subject to photograph. Details in the shadows of the Indonesian ebony statue and the dark blue antique carriage body, combined with those in the white coral, helped us determine the dynamic range. The neutral-colored lace spread helps pinpoint depth of field from the front to the back. Other areas that we studied in each picture were the unusual colors of the Louis Napoleon plate and the car-



This sample, from the Kodak DC-50 camera (\$900 street), shows the poorer resolution of the entry-level models.

riage, the modulation of light on the horses, curved edges for aliasing and pixelization, and the thin painted lines on the plate.

HOW WE TESTED

For the still life, we used a Majestic studio tripod and a two-head Speedotron Model D402 studio strobe system (main light and highlight), plus a 3-foot white reflector. We set the cameras' f-stops to manual and used their fastest shutter speeds for X synchronization. With the Polaroid PDC-2000/40, which does not offer manual mode, we shot on full automatic. All photos were taken from the same distance and reprinted here full-size; differences in how the subject is framed result from the focal length of the lens and the size of the camera's CCD.



AGFA ActionCam

The AGFA ActionCam produced the most accurate colors in our test group. It combined a clear focus and an even exposure with sharp details in the shadows and highlights. Though it lacked the pixel depth to capture the ring and necklace chain, it still managed to create a very pleasing, professional-looking image.



Kodak Professional DCS 460

The high-end Kodak Professional DCS 460 exhibited the same Kodak tendency toward a color shift, but it had by far the greatest amount of data out of all the cameras we tested. It was the only camera that could capture both the ring and the necklace chain. All other areas of the picture exhibited fine detail, good depth of field, minimal or nonexistent aliasing, and subtle modulations of color and light.

**Minolta RD-175**

Although the Minolta RD-175 is supposed to be exactly the same as the AGFA ActionCam, our tests showed that the RD-175 consistently introduced a noticeably rosy hue. This may be pleasing aesthetically, but it is not accurate. It did have the same level of sharpness, dynamic range, exposure, and resolution as the ActionCam.

**Kodak Professional DCS 410**

The Kodak Professional DCS 410 exhibited a definite magenta color shift, and its relatively low resolution became evident when we enlarged the photo. It captured a full dynamic range from shadow to highlight, but there was nothing exciting or crisp about the image.

**Fuji Fujix DS-505A**

The Fuji Fujix DS-505A captured a full dynamic range, from the shadowy ebony statue to the various areas of highlights. The picture was sharp and had good depth of field, but it lost detail in the highlights because it was slightly overexposed. Although the image quality looks good at first glance, a closer inspection reveals a breakdown in various areas of detail because of the camera's limited resolution.

**Polaroid PDC-2000/40**

Because its sonar auto-focus cannot be overridden manually and tends to zero in on the largest object, the Polaroid PDC-2000/40 produced a soft, blurry picture. Nothing was in focus, and detail was lost in the shadows of the black Indonesian statue. Also, there were no true whites (noticeable especially in the highlights of the medallion).



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Midrange Digital Cameras

and disadvantages to both solutions. Masking or framing doubles the focal length of every lens, effectively eliminating wide-angle photography. By contrast, the DS-505A's condenser lens doesn't increase your camera lens's focal length, but it does significantly decrease the amount of light falling on the CCD (the fastest f-stop is f6.7). This might cause vignetting with some lenses.

ISO equivalency, or film sensitivity, may be higher or lower than what you're accustomed to. Except for the DS-505A, which can switch between 800 and 3200, the ISO equivalencies are unchangeable. You can work around this problem by carrying an assortment of neutral-density filters or extra strobe lights.

Then there's the burst mode. Most pro 35-mm cameras have built-in or attached motor drives for capturing sports and other fast-action events. These cameras can shoot anywhere from 2 to 8 frames per second. Digital cameras are slower at capturing, converting, and saving images. Our fastest camera, the DS-505A, records at the rate of 1 frame per second.

INTO THE GAP

Although midrange and high-end digital cameras are much more expensive than 35-mm pro cameras, the gap is narrowing. Despite its \$9,995 list price, the Minolta RD-175 can be bought for less than \$5,000 on the street. The new Nikon F5, a traditional film camera, sells for about \$3,500.

Back in 1991, early testers of the prototype of what became the \$25,000 Kodak DCS 100 were less than impressed with its resolution, color, and operating efficiency. (It required a 10-pound shoulder pack to house the battery and hard disk.) Besides becoming cheaper, midrange digital cameras now capture more true-to-life color and better detail without necessarily increasing resolution. Twain drivers, removable media, and CD-R drives have made image acquisition and storage both practical and efficient.

Digital photography has become less of an exotic new technology and more of a workhorse for quick, quality production. It won't be too long before digital photography equals and then supplants film as the medium of preference among professionals. The cameras we review go a long way toward bringing that future to pass.

AGFA

ActionCam

Minolta

Minolta RD-175

ALL REVIEWS BY DANIEL GROTTA AND SALLY WIENER GROTTA

A camera that combines simplicity and excellent image quality at a reasonable price would be the holy grail of digital photography. These well-designed, easy-to-use cameras, jointly marketed as the ActionCam, by AGFA (\$5,500 street), and the Minolta RD-175 (\$5,000 street), come close to realizing such an ideal. Unfortunately, both packages are marred by poor software bundles.

The ActionCam and RD-175 are based on a Minolta Maxxim 500si body (popular with advanced amateur photographers) rather than a much more expen-



Although the ActionCam and RD-175 perform well, their software is sorely deficient.

sive professional Nikon or Canon body. Both cameras have far fewer options and controls than the Kodak, Fuji, and Nikon models we tested, but the design makes them a lot easier to use.

The ActionCam and RD-175 offer an excellent 1,528-by-1,146 resolution. Both cameras employ an optical beam splitter, which allows the primary colors to fall on three less expensive 380,000-pixel CCDs rather than one expensive megapixel CCD. In addition to keeping costs down, this approach helps boost resolution and virtually eliminates color aliasing. But the design does have some minor trade-offs: It offers a maximum f-stop of f6.7, a slightly dim viewfinder, and a thicker camera back.

On our tests, both the ActionCam and the RD-175 performed best either out of doors or while using the built-in flash. Although the units have a PC flash terminal as well as a hot shoe and optional wireless

flash, the ISO of 800 is relatively high. In the studio, the camera's performance is less than satisfactory: Its maximum sync speed is supposedly $1/90$ second, but because there is no $1/90$ setting we could set it no higher than $1/60$ second.

The ActionCam accurately captured our still life, displaying a dynamic range between the highlights and shadows while retaining details in both. The colors were accurate, perfectly saturated, and consistent. The RD-175, using an identical lens and similar lighting, produced a slightly rosy hue in both the still life and the portrait. And while our bright outdoor shots taken with the ActionCam were perfectly exposed and captured colors correctly, those taken with the RD-175 were consistently 1.5 stops underexposed.

Surprisingly, the software turned out to be a big disappointment. The Twain drivers in both cameras do not work with Adobe Photoshop 4.0, so we had to acquire images one at a time in Corel PhotoPaint. Neither AGFA nor Minolta plans on releasing a better driver anytime soon. This means that Windows users will need to open images one at a time, which takes about 3 minutes per image. That annoyance aside, the ActionCam and the RD-175 get the nod for the best price and performance of the midrange cameras we reviewed.

ActionCam. Street price: \$5,500. AGFA, Ridgefield Park, NJ; 800-227-2780, 201-440-0111; www.agfahome.com. Circle 473 on reader service card.

Minolta RD-175. Street price: \$5,000. Minolta Corp., Ramsey, NJ; 800-506-3296, 201-825-4000; www.minoltausa.com. Circle 474 on reader service card.

Eastman Kodak Co.

Kodak Professional DCS 410, DCS 460

With 11 models priced from \$200 to \$30,000, Eastman Kodak Co. has managed to fill every microniche of the burgeoning digital-camera market. Among its offerings are six professional models based on either a Nikon N90s or Canon EOS-1n body. We tested the Kodak Professional DCS 410 (\$7,000 list), which is aimed at professionals on a budget, as well as the top-of-the-line DCS 460 (\$27,995 list). Each camera is mated to a Nikon body.

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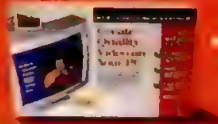
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Midrange Digital Cameras

Kodak has positioned its electronic circuitry below and behind the conventional camera body, making the units somewhat larger and heavier than a standard Nikon N90s. Still, we found both Kodaks very easy to grip and shoot. The DCS 410 and DCS 460 look and operate just like a N90s film camera: They can be



The Kodak DCS 410 produces good images but is no match for the DCS 460.

programmed to operate on fully automatic, shutter or aperture priority, or manual, and they can mount virtually any Nikon lens or accessory. Both offer extensive customization and control features, including various focusing, metering, exposure compensation, and flash modes. The N90s' built-in microphone even lets you verbally identify or annotate shots and record .WAV files on PC Type III cards.

The differences between the two models become apparent when you are looking through the viewfinder. The DCS 410's viewfinder has a small rectangular frame in the center (about 20 percent of the total viewing area) to indicate the capture area of its half-inch-square, 1.5-million-pixel CCD. This makes the effective focal length more than 2.5 times the normal lens coverage (a 24-mm lens acts like a 50-mm lens, and so on). The DCS 410 captures images as 1.5MB proprietary TIFF files that decompress to 4.4MB.

By contrast, the DCS 460's black frame covers about 80 percent of the viewing area, making the effective focal length of a 50-mm lens approximately 60 mm. It employs a 7/8-inch-square, 6-million-pixel CCD—four times the size and density of the DCS 410's CCD—and captures proprietary TIFF images that decompress to 18MB. Its CCD is the largest, densest, and therefore most expensive one available for real-time

portable photography.

Another difference is the cameras' burst modes. The DCS 460 can fire off two frames in 2 seconds and then requires 8 seconds to reset; the DCS 410 can only take one frame every 2.5 seconds. Unfortunately, the DCS 410 and DCS 460 aren't perfectly integrated with their off-the-shelf Nikon bodies. While they have ISO equivalents of 100, you could mistakenly program the cameras to equivalencies anywhere from 8 to 6,400 and ruin a shot (the ISO returns to the correct default setting after each shot). Though the drive mode is disabled internally, it's still easy to switch to the wrong settings on the control panel.

Our test images revealed dramatic resolution differences not only between the DCS 410 and the DCS 460 but also between the DCS 460 and the other cameras we tested. The DCS 460 produced images that resembled film-based photographs. It even captured subtle details such as those found in jewelry. We were able to magnify the images 500 percent in Photoshop before noticing individual pixels. The DCS 460 is the only portable digital camera on the market that lets you enlarge print images to 11 by 14 inches without exhibiting pixelization.

Pixels appeared on the lower-resolution DCS 410 images at 2X magnification. While the DCS 410 showed good dynamic range, images were not as crisp as those from other cameras. And with both units, we spotted a longtime Kodak problem: the CCDs' bias toward a magenta-to-blue shift. Kodak minimizes (though it doesn't eliminate) this by including an infrared filter with each camera.

The DCS 460 comes closer to replacing a conventional 35-mm professional camera than any other digital camera on the market, but the cost for this privilege is steep. Although the DCS 410's burst mode is limited and the image quality is far from spectacular, it is still an adequate choice for photojournalists and others who need to move quickly from capture to print.

Kodak Professional DCS 410. List price: \$7,000. **Kodak Professional DCS 460.** List price: \$27,995. Eastman Kodak Co., Rochester, NY; 800-245-6325, 800-235-6325, 716-724-4000; www.kodak.com. Circle 475 on reader service card.

Fuji Photo Film U.S.A.

Fujix DS-505A

Unmistakable size, shape, and weight distinguish the Fujix DS-505A (\$9,995 list) from other midrange digital cameras. Jointly developed and marketed by Fuji and Nikon, the camera is also available as the Nikon E2n (\$10,000 street; 800-526-4566; www.nikonusa.com). The Fujix DS-505A we tested is a solid, versatile professional digital system good for both location and studio use. The camera can capture images under almost any conditions that are suitable for photo-quality 8-by-10 prints.

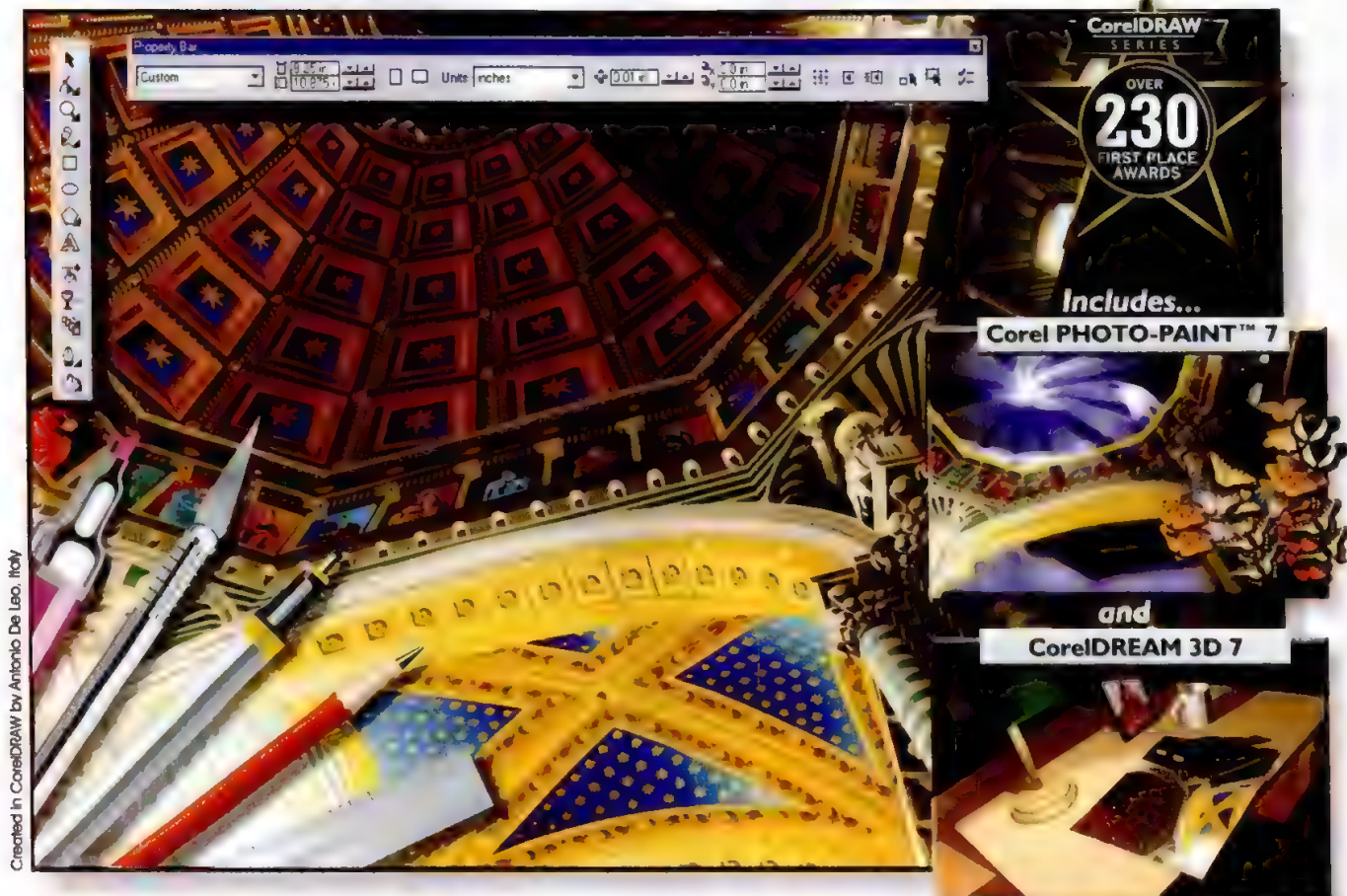
Nevertheless, the DS-505A's design has a few drawbacks that may disqualify it for some users. For one thing, its limited resolution of 1,280-by-1,000 is the second lowest of all the cameras we tested. Another disadvantage is its klunkiness. Although it can be operated as a handheld camera, the DS-505A is as large and heavy as a medium-size studio camera (you'll be more comfortable using it with a tripod). And though the camera gives users a very wide latitude of control—featuring video-out for displaying saved images, five white-balance settings, and various metering, focusing, and flash modes—it can be unusually complicated to master, even for professionals familiar with the 35-mm Nikon F4 pro camera incorporated as the front end.

The DS-505A is the only digital camera with a full-frame viewfinder (1 by 1.5 inches), even though its 1.3-megapixel CCD is only 2/3-inch square. This means that you'll get equivalent area coverage and focal length of the lens, thanks to a condenser lens that magnifies the capture area. The tradeoff is a loss of light: No matter how fast the f-stop of the lens, the



The Fujix DS-505A is a bit too heavy and awkward for field use.

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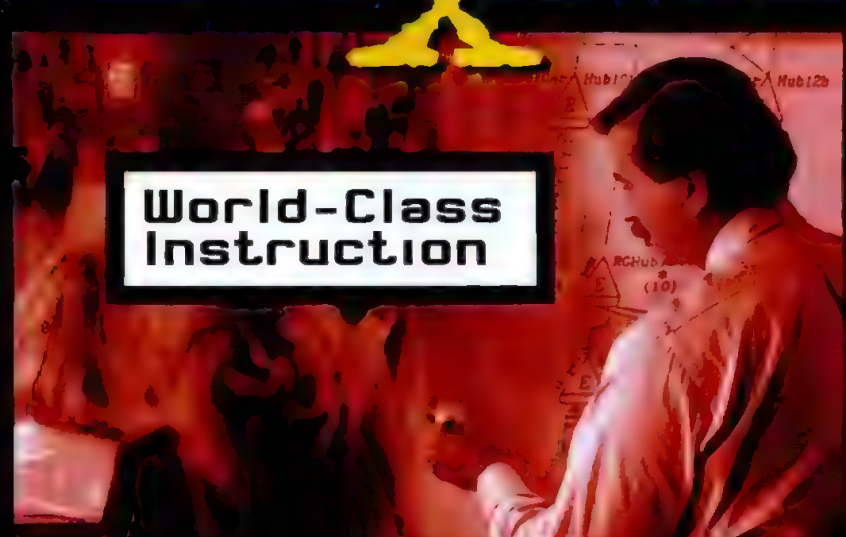
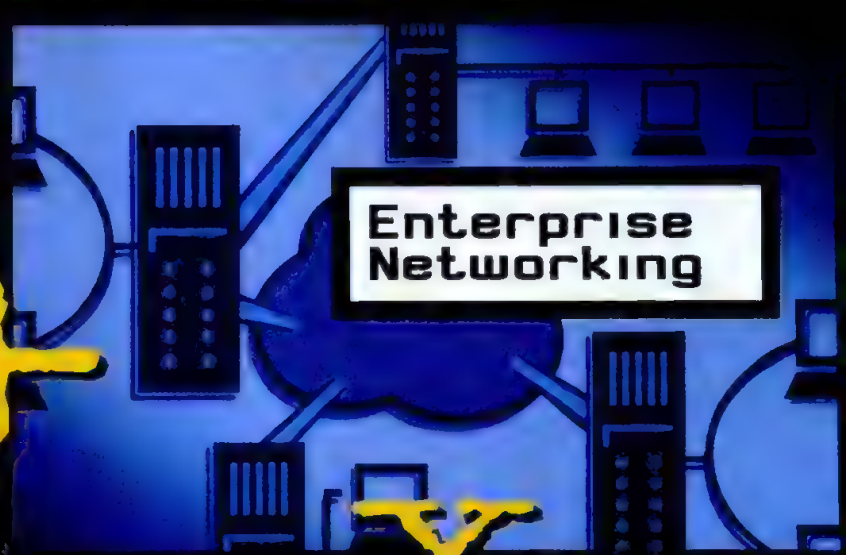
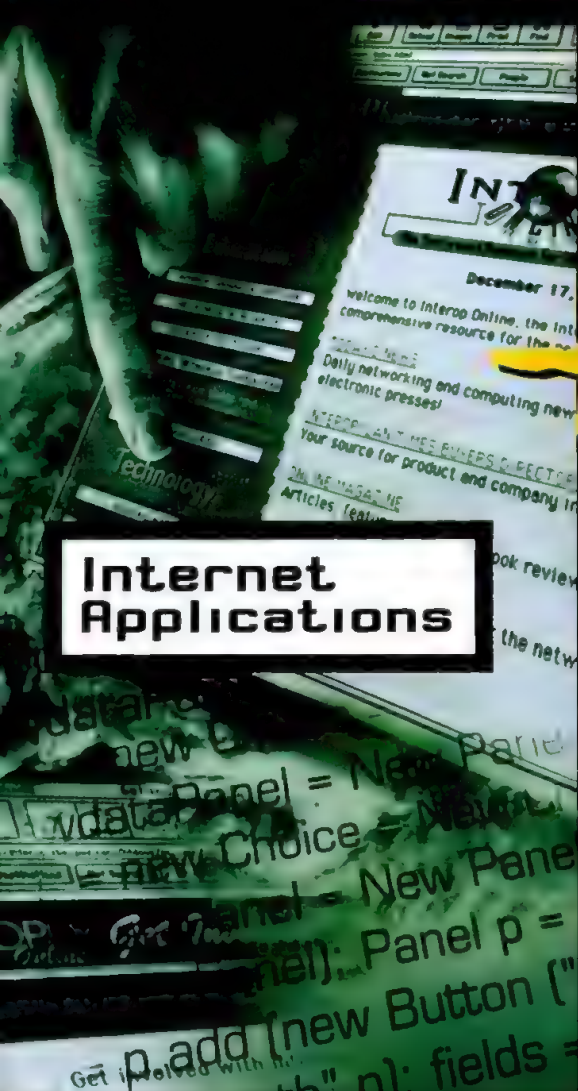
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Ricoh RDC-1: A Digital Camera and More

The midrange digital-camera market is a niche within a niche, and it's rapidly spawning even more sub-niches. The Ricoh RDC-1 (\$1,700 street), for example, blurs the lines between a digital camera, camcorder, and tape recorder. But this sophisticated device is complicated and sometimes cumbersome to operate without constantly referring to the documentation—so much that users may shy away from some of its powerful features and use it to capture still images only.

The camera is sleek and stylish yet small and thin enough to slip into a shirt pocket. Because its outer skin is metal (not plastic), the RDC-1 has the look and feel of a quality precision instrument. Its specs are equally impressive: a 410,000-pixel CCD with a resolution of 768-by-576 and a high-quality, nine-element f2.3-auto-focus 3X-power zoom lens with macro capability and optical viewfinder. This gives it enough pixel punch to take snapshot-quality 4-by-5 prints and record motion at 30 fps with audio, video, and even S-video output. The outfit ships

with an 8MB memory card, an AV interface, a wireless remote control, nickel cadmium batteries, and a charger. A clip-on LCD color viewer is a \$539 option.

Shooting stills is fast and simple: Just point and shoot. Users will have no difficulty turning the flash on and off, triggering the self-timer, or changing compression rates (economy and normal modes). Switching to other modes proves more challenging: Users must commit to memory the correct button combinations to push.

While the RDC-1 lets you record full-motion video and sound, even with maximum data compression its 8MB card only has room for a 5-second clip. And in order to record continuous images, Ricoh chose older, nonstandard JEIDA cards rather than standard ATA.



The RDC-1's 768-by-576 dpi images are quite good.

There are other annoyances. The Off/Play/Record switch is too easy to push accidentally, and without an automatic cut-off the batteries drain quickly. The LCD viewer adds 3.5 inches to the camera's 5-inch length, making it awkward to view while shooting. And oddly enough, it's not possible to charge the camera's batteries without first snapping on either the LCD viewer or the video adapter.

Still, the RDC-1 is the only digital camera on the market that boasts both

still-image capture and full-motion video with sound capability, and its image quality is quite good. If you want more capabilities than an entry-level digital camera provides but don't need a \$3,000 mid-range model, the Ricoh RDC-1 (warts and all) is worth a look. —DG and SWG

largest opening will always be f6.7. Fuji compensates for this by upping the ISO equivalent to 800 or 3,200.

Once you figure out how it works, you'll be able to operate the DS 505A quickly. The camera is rated at a frame per second, but we were able to fire only one frame every 2 seconds. Nevertheless, it boasts the quickest recycle time of the cameras we tested. Moreover, its Type II PC Card memory can be swapped much faster than film, and the nickel cadmium battery pack can be exchanged in seconds. The autofocus mechanism is very responsive and accurate, and the video-out capability lets you display freshly shot images to clients or to an art director in another city.

It's also swift business to upload images. The DS-505A saves images in JPEG format, which can be opened easily in any image-editing program—with one notable exception. The camera's best image mode, Hi Quality, saves images as un-

compressed 2.3MB TIFF files, which we were unable to open in either Photoshop 4.0 or Corel PhotoPaint 6 because of unsupported color space. Fuji includes a Photoshop plug-in for opening TIFF files.

Image quality is sharp and well detailed, with a full and even dynamic range. Using studio strobes, you can produce almost natural colors. Outside, on a snowy, sunny day, colors lacked snap and saturation, though the DS-505A did not introduce any hue shifts. The CCD's low resolution becomes apparent when the picture gets enlarged.

The DS-505A is an excellent camera for portraits, product shots, and many medical and industrial applications. But its shape and weight make it too unwieldy for photojournalism and other commercial applications.

Fujix DS-505A. List price: \$9,995. Fuji Photo Film U.S.A. Inc., Elmsford, NY; 800-378-3854, 914-789-8100. *Circle 476 on reader service card.*

Polaroid Corp.

Polaroid PDC-2000/40

The Polaroid PDC-2000/40 (\$3,300 street) is the least expensive and also the most limited camera we tested. More analogous to a point-and-shoot camera, the PDC-2000/40 should appeal to budget-minded users who need to output good 8- by 10-inch photo-realistic prints. But for serious studio or location use, you'll need to look elsewhere.

The PDC-2000/40 lacks such amenities as user-selectable f-stops and shutter speeds, removable storage media, a PC flash connector, and a cable release. Polaroid also fails to offer a wide range of interchangeable lenses and accessories. We were able to devise a successful work-around by turning on the camera's flash and covering it with a photoelectric eye (a "slave" unit) connected to our studio strobe lights. This enabled the camera to

SUMMARY OF FEATURES

Digital Cameras

	AGFA ActionCam	Eastman Kodak Professional DCS 410	Eastman Kodak Professional DCS 460	Fuji Fujix DS-505A	Minolta RD-175	Polaroid DC-2000/40
■ YES ■ NO						
In alphabetical order by company						
List/street price cited	\$6,995, \$5,500	\$7,000, N/A	\$27,995, N/A	\$9,995, N/A	\$9,995, \$5,000	\$3,695, \$3,300
Resolution (pixels)	1,528 x 1,146	1,524 x 1,012	3,060 x 2,036	1,280 x 1,000	1,528 x 1,146	1,600 x 1,200
Color depth	24-bit	36-bit	36-bit	24-bit	24-bit	24-bit
Burst-mode rate	1 frame per 2.4 seconds	1 frame per 2.5 seconds	2 frames per 2 seconds	1 frame per second	1 frame per 2.4 seconds	1 frame per 7 seconds
CCD density (millions of pixels)	380,000 x 3 CCDs	1.5 million	6 million	1.3 million	380,000 x 3 CCDs	1 million
Lens-mount type	Minolta A	Nikon F	Nikon F	Nikon F	Minolta A	Proprietary
Shutter speed (seconds)	1/2 to 1/2,000	30 to 1/8,000	30 to 1/8,000	1/2 to 1/2,000	1/2 to 1/2,000	1/25 to 1/500
Automatic white balance/Manual f-stops	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
ISO equivalency	800	100	80	800-3200	800	100
Built-in flash	■	■	■	■	■	■
Compressed/decompressed file size	1.1MB, 5MB	1.5MB, 4.5MB	6MB, 18MB	1.3MB, 3.7MB	1.1MB, 5MB	1MB, 5.6MB
Storage capacity/Number of shots	131MB, 114	260MB, 173	260MB, 43	15MB, 81	131MB, 114	40MB, 40
Accepts Type I/Type II PC Card memory	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Interface to computer	SCSI-2	SCSI-2	SCSI-2	Serial	SCSI-2	SCSI-2
Cable release socket/Wireless trigger	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Video out	■	■	■	■	■	■
Battery type	Lithium	Nickel hydride	Nickel hydride	Nickel cadmium	Lithium	Nickel cadmium
Hardware accessories included	Minolta zoom lens, SCSI cable, AC adapter	SCSI cable, AC adapter, cable adapter, lens/CCD cleaner kit	SCSI cable, AC adapter, cable adapter	None	SCSI cable, AC adapter	SCSI cable, AC adapter
Software included	Adobe Photoshop LE, Agfa Fotoflavor, Agfa Fototune CM, Photo-impact	PC Twain driver	PC Twain driver	Adobe Photoshop acquire module	Adobe Photoshop for Mac plug-in, Twain driver, grabber software	PDC Twain module, Adobe Photoshop acquire module, PDC-2000 Direct
Warranty (parts and labor)	1 year	8 months	6 months	1 year	1 year	1 year
Toll-free technical support	■	■	■	■	■	■
Technical-support hours (eastern time)	8:00-8:00 M-F	8:00 A.M.-8:30 P.M. M-F	8:00 A.M.-8:30 P.M. M-F	9:00-5:00 M-F	8:30-5:00 M-F	8:00-8:00 M-F
Web address	www.agfahome.com	www.kodak.com	www.kodak.com	None	www.minoltausa.com	www.polaroid.com

N/A—Not applicable: The product does not have this feature.

do basic studio work for our test photos.

The PDC-2000/40 incorporates a cumbersome sonar auto-focus mechanism that is similar to Polaroid's long-discontinued SX-70 camera. It does have a 1-megapixel CCD (designed by Polaroid and manufactured by IBM). This CCD can produce a raw 1.3MB image at 800-by-600 resolution without interpolation or a 5.76MB TIFF file when interpolated to 1,600-by-800.

It's easy enough shooting horizontally with this strangely shaped, futuristic-looking camera. But in the vertical mode, the viewfinder is located below the lens, and you must raise your right hand in an awkward position to reach the shutter release. Because the PDC-2000/40 saves to built-in solid-state RAM—you can store 40 images before you need to offload to a computer—we had expected it to recycle faster than its poky 5.7 seconds without flash and 12 seconds with flash.

The 11-mm f2.8 lens focuses automatically on subjects only 10 inches away, but

there's no parallax correction in its optical viewfinder. The camera lacks a manual focus, although you can lock the focus to take a picture of an object that's not in the center of the viewfinder. There's also no regular exposure compensation, although the camera does have a button for back-light compensation.

Images from the PDC-2000/40 are detailed, but they are also somewhat soft in



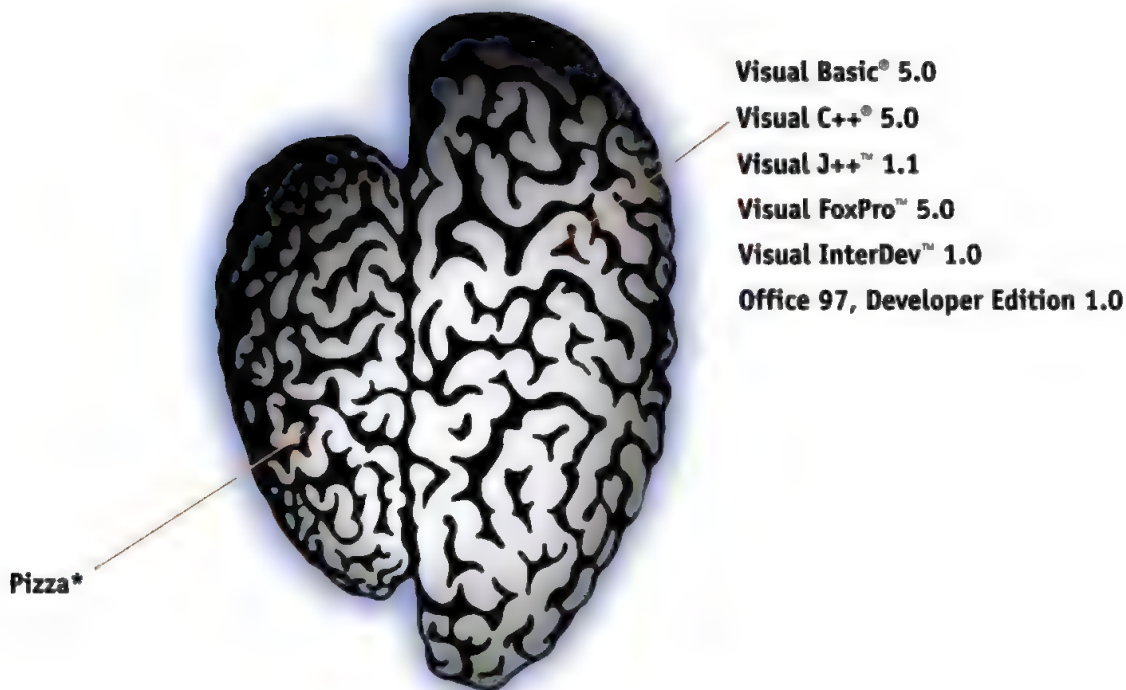
The Polaroid PDC-2000/40 lacks many features that most professionals will want.

focus. Applying a sharpen filter significantly improves image quality, though.

The camera captures flesh tones nicely, if a bit on the red side. We were impressed with its ability to capture different modulations of light in our still life, although we noticed a slight pinkish cast. Because we were forced to move the camera closer (Polaroid's only other lens—a 60-mm portrait lens—was not available for our tests), there was considerable flare in the shot. There was also an unacceptable amount of blue in the shadows of our outdoor images.

In its present state, the PDC-2000/40 is neither fish nor fowl—neither an entry-level camera nor a truly professional or semiprofessional tool. It is best thought of as a cost-efficient digital complement to your traditional camera arsenal. □

Polaroid PDC-2000/40. Street price: \$3,300. Polaroid Corp., Cambridge, MA; 800-816-2611, ext. 868, 716-256-4436, ext. 868; www.polaroid.com. Circle 477 on reader service card.



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PC Tech

THE DEFINITIVE GUIDE TO PC TECHNOLOGIES & TOOLS

Version-Control Software

Tools for managing change in complex development environments.



By Gabrielle Gagnon

Managing change has always posed challenges to applications developers. Even when development projects are clearly defined and quality-controlled—which they often aren't—software engineers have to rewrite code to accommodate new features and functions that users need. Software is continually evolving, but ironically, developers frequently have to go back to earlier incarnations of their work to keep up with change.

Studies show that less than 30 percent of a developer's time is spent in programming new software; most is occupied with existing code. Commercial product engineers in particular need a way to maintain parallel releases, since they must often support multiple versions of the same product for different customers. Even on the Web, where most of the new applications are being developed, experts claim that Webmasters spend 50 percent of their time making changes rather than producing new content.

Applications include more than source code. Supporting docu-

IN THIS SECTION



TUTOR The third installment of our series showing you how to build a sample application with Microsoft Visual C++ gets to the heart of how a program processes and keeps track of input and data. We'll make changes to the code in our example tic-tac-toe program's document class so that it can keep track of the games' X's and O's. *Page 229.*



POWER PROGRAMMING The Web is a great medium for getting your message out, but sometimes you want information back from the people who browse your site. The standard way to accomplish this is with CGI. Learn how to implement a CGI script using an example restaurant-search application. *Page 235.*



OPERATING SYSTEMS With Windows 95, installing new programs on your system has gotten more complex and hidden from the user. Since the use of the Registry instead of .INI files is largely responsible for this new complexity, we give you a glimpse of what happens in the Registry when you install a program. *Page 247.*



UTILITIES Windows 95's Explorer utility is a vast improvement over its predecessors, but if you simply want to copy a text list of filenames rather than the actual content of the files, you're out of luck. Our FileGrab utility fills this need, working cooperatively with Explorer to get you text filenames. *Page 261.*

ALSO IN THIS ISSUE In PC Solutions, we give you an easy way to create a no-frills Web page for free, let you know whether you should pay attention to the order in which you turn off the components of your computer system, and much more. *Page 271.*

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mentation, in the form of user requirements, analysis and design diagrams, user guides, marketing materials, and artwork, are all part of an applications development project. Even for a small project, manually keeping the user documentation and program changes in sync can be an administrative nightmare.

Team development introduces even more complexity, since the potential for team members inadvertently stepping on each other's toes increases with the number of people sharing documents. Extra measures need to be taken to ensure authorized access to documents and protect their integrity.

In large development projects with thousands of interrelated code modules and supporting documents, small errors in any of these areas could create a domino effect that might cost a company millions of dollars. There has to be some way of handling change effectively.

Enter Software Change Management (SCM) tools. SCM products address the problems of administering development projects and avoiding the pitfalls inherent in team development and ongoing software maintenance. They include facilities for document management and version control, defect tracking, team communications, build management, and reporting.

Version-control products in particular focus on tracking and coordinating changes to documents. They include document management resources to organize files and manage storage, library check-in/check-out and file-locking facilities to control access to shared documents, branching and merging mechanisms to manage parallel development tracks, file comparison and differencing utilities to highlight discrepancies between different versions of documents and to resolve conflicts, versioning schemes to identify milestones and group-associated documents, version history to trace each document's evolution, and audit logs to track processing.

Some of the issues peculiar to version control have spawned specialized technologies. Managing storage, for example, can be particularly problematic when dealing with several generations of changes. Keeping separate copies of entire files, called *omega storage*, wastes space, especially when changes are minor. So version-control packages use special file compression, usually *delta storage* (which keeps only one complete copy of the file and computes differences), to store successive versions of files. Also, numerous innovations were brought about because of team-development needs. Automatic branching and merging, for example, allows several developers to work on different parts of the same program in parallel and merge their results into one file when finished.

The products in this roundup, Microsoft Visual SourceSafe 5.0, Intersolv's PVCS Version Manager 5.2.20, and StarBase's StarTeam Workstation 2.0, are three version-control

SUMMARY OF FEATURES

Version Control

	■ YES ■ NO ■ OPTIONAL	Microsoft Visual SourceSafe 5.0	PVCS Version Manager 5.2.20	StarTeam Workstation 2.0
Products listed in alphabetical order				
Platform				
Windows 3.x		■	■	■
Windows 95/Windows NT		■ ■	■ ■	■ ■
DOS		■	■	■
Macintosh		■ (via Motoworks)	■ (via Synergex)	■
OS/2		■	■	■
Unix		■ (via Mainsoft)	■ (via Synergex)	■
Networks/Protocols				
IBM LAN Server		■	■	■
Microsoft LAN Manager		■	■	■
Named Pipes		■	■	■
NetBIOS/NetBEUI		■ ■	■ ■	■ ■
Novell IPX/SPX		■ ■	■ ■	■ ■
TCP/IP		■	■	■
Architecture				
Architecture type		Repository	File-based	Repository
Client/server		■	■	■ (separate package)
Remote-access		■	■	■ (separate package)
Web browser access		■	■	■ (separate package)
Version Control				
Audit trail of control actions		■	■	■
Automatic branching/merging		■ ■	■ ■	■ ■
Visual file comparison		■	■	■
Reverse delta versioning		■	■	■
Omega versioning		■	■	■ (on binary files)
Supports all file types		■	■	■
Keyword expansion		■	■	■
Mask/renumber columns		■ ■	■ ■	■ ■
Visual differencing		■	■	■
Defect handling		■ (3rd-party package)	■ (separate package)	■
Build management		■	■ (separate package)	■
Audit reports		■	■	■
Charting		■	■ (separate package)	■
Command line interface		■	■	■
Administration				
Project locks		■	■	■
Optional file locks		■	■	■
Force unlock		■	■	■
File compression		■	■	■
Team Development				
Multiple check-in/check-out		■	■	■
File sharing across projects		■	■	■
Threaded conversations		■	■	■
Process Management				
Promotion model		■	■	■
Triggers		■	■	■
Security				
Password protection		■	■	■
User groups		■	■	■
Group privileges		■	■	■
Customized privileges		■	■	■

VISIO

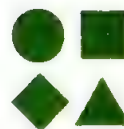
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packages for the Windows platform. They all contain version-control functions that have typically existed, until recently, only on mainframe and minicomputer systems, and they've added PC-specific, user-friendly functionality too. But despite their similarities, these products take very different approaches to handling version-control functions.

Visual SourceSafe takes a Microsoft-centric view that integrates version control seamlessly into Microsoft development environments. PVCS represents an interoperative, cross-platform enterprise development approach with a suite of highly specific products to address different aspects of change management. And StarTeam simplifies and consolidates version-control functionality with other change management tools, such as defect tracking and build management, to present a single, easy-to-use interface. The individual reviews here should help you decide which approach works best for you.

Microsoft Corp.

Microsoft Visual SourceSafe

Microsoft Visual SourceSafe 5.0, a \$499 version-control package for Windows 95 and Windows NT, is Microsoft's latest foray into management software for the enterprise. Its tight integration with Microsoft development tools makes it a good choice for companies that have standardized on Microsoft products and that like the productivity Microsoft's masterful interfaces have to offer.

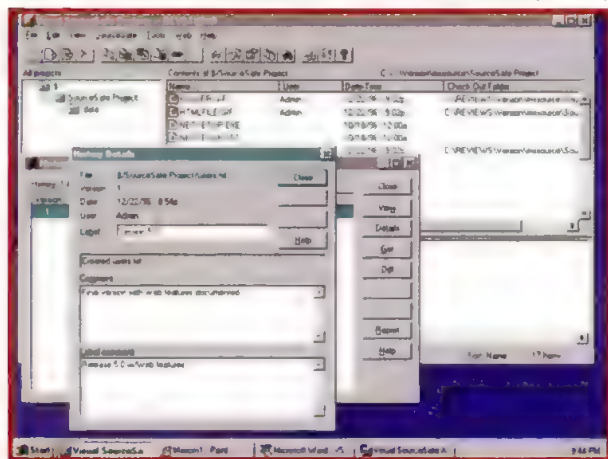


FIGURE 1: Windows Explorer is the main user interface for Microsoft Visual SourceSafe, but Visual SourceSafe menus and commands can be integrated into other Microsoft development tools, such as Visual Basic and Visual C++.

The package's narrow focus on Windows 32-bit platforms makes it off-limits to die-hard Windows 3.x and DOS developers, but third-party support does make it available to Macintosh and Unix users.

It's hard to beat Visual SourceSafe's compre-

hensive and seamless integration with Microsoft tools. In Version 4.0, only Visual Basic and Visual C++ were coupled with the Visual SourceSafe environment. Version 5.0 has added full support for Visual J++, Visual FoxPro 5.0, Access 97 Developer's Kit, Visual Test, and FrontPage 97, Microsoft's Web authoring tool. Visual SourceSafe also supports Word and Excel. In each of these products, Visual SourceSafe commands are available as menu items, and dialog boxes prompt users through checking out files and other operations. A dockable toolbar with the most frequently used Visual SourceSafe commands is also available.

Visual SourceSafe's graphical user interface is equally impressive. (For those who want a more direct way to utilize the environment, a command line interface is also provided.) Visual SourceSafe Explorer, similar in appearance to Windows Explorer, provides intuitive icons to indicate the status of each file and to facilitate basic functions. For example, earlier versions of a file can be viewed from a project-history screen and can be rolled back by pushing a button. New OLE automation interfaces have also been added for Visual Basic and Visual C++.

Other new interface features include Visual Merge and Project Difference dialog boxes. Visual SourceSafe allows developers to work on different copies of a file and merge the results before putting the file back in the repository. When merging, Visual SourceSafe looks for conflicts between copies. If any are found, they are highlighted and displayed side by side, making it easy for developers to spot differences. A conflict can be resolved with a simple click of the mouse, and the merged result is displayed in a lower panel. A similar feature, Project Difference, keeps multiple copies of a project in sync.

Probably the most significant enhancement to Visual SourceSafe in Version 5.0 is Web support. Microsoft has added three new features specifically for handling HTML documents: hyperlink-checking, site-map creation, and Web deployment.

The hyperlink-checking facility looks for broken links between internal HTML files and displays them in a dialog box. (External links are listed but not checked.) You can

configure Visual SourceSafe to check links just in your work area or in the entire project. You can also tell the program to perform recursive checking (that is, searching for broken links in subfolders or subprojects as well as in the main project). In addition to HTTP URLs, file, FTP,

gopher, and mailto URLs are also supported.

A fairly rudimentary site-mapping feature constructs a map using the <TITLE> tags from HTML files. If you don't take it upon yourself to come up with unique and descriptive names for your titles, though, the tool isn't of much use.

Another simplistic feature is the Web Deploy command. Once the Visual SourceSafe administrator has designated servers for a project, issuing the Deploy command sends project files to the appropriate server or servers. An entire project is deployed—you can't select specific files—and Visual SourceSafe always overwrites existing files with newly deployed files. Although this command was introduced as a Web-specific feature, you can use it to move files to other types of servers—not necessarily Web servers. If you're on a TCP/IP network, you can use FTP to send files to servers beyond your local area.

Though promising, Web support is currently weak. And once you look away from the interface, the product shows other flaws as well. For enterprise-wide team development, Visual SourceSafe's Microsoft-only focus is too restrictive. Most enterprise developers use a variety of tools and platforms, and much of their work is in supporting legacy systems. It's clear that Visual SourceSafe was designed to work with Microsoft products alone. Also, there is no integration with other software configuration management tools, and Microsoft does not provide a comprehensive set of its own.

Microsoft has made some attempts to shore up these gaps with third-party tools. Metroworks has written a Macintosh version of Visual SourceSafe, and Unix support is available through Mainsoft. A third-party defect-tracking tool is also available. Visual SourceSafe has no makefile utility either (although Microsoft's products don't really need one). Still, if you weren't using files from a Microsoft development product, such a build utility would be useful.

Security is also minimal. Only four security levels exist for access rights, and the system lacks promotion levels. Administrators cannot assign group rights, so everyone must be configured individually. Single-project hierarchy makes it difficult to administer large, complex projects, and reporting capabilities—another necessity for large projects—are almost nonexistent.

On the plus side, the documentation contains some pleasant surprises. In the past, Microsoft documentation was handy as a memory jogger but was of little practical use to newcomers, since it consisted almost entirely of jargon-filled how-to lists with little explanation as to why you would want to perform such procedures. Visual SourceSafe's documentation, however, includes an overview section that poses the kinds of questions a first-time user might ask. The remainder of the User's Guide lapses into bare-bones pro-

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cedures again, but the beginning of the book is quite an improvement. And as with most CD-ROM products, all of the printed documentation is available online.

Microsoft Visual SourceSafe is ideal for Microsoft product users who want to track small projects without a lot of formal controls and to manage simple Web sites. But if you need robust configuration management tools with audit trails, cross-platform portability, and integration with multiple packages, one of the other products would be a better choice. **Microsoft Visual SourceSafe 5.0.** List price: \$499. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; TT/TDD, 800-892-5234; www.microsoft.com/ssafe. Circle 458 on reader service card.

Intersolv Inc.

PVCS Version Manager

Intersolv's PVCS Version Manager, now in Version 5.2.20, is the classic of PC-based change management software. Of the three packages reviewed here, PVCS is the best known and the most widely used. It has been integrated into more than 40 development environments, and it interoperates with numerous design, testing, and distribution tools.

Version Manager is one of a suite of PVCS tools that handle all aspects of change management. Other products include PVCS Configuration Builder; Tracker, for handling defect tracking; Notify E-Mail; Reporter; and Developer's Toolkit, an API interface for integrating PVCS functionality into third-party software. While Version Manager does provide makefile support and standard reporting capabilities that go beyond the boundaries of straight version control (which Microsoft Visual SourceSafe does not), it is a specialized product. PVCS users who need customized reports or build management will have to pay extra for it.

Geared for enterprise development teams, PVCS has the broadest platform support of the three products. On Intel platforms, Version Manager is available for DOS, Windows 3.x, Windows 95, Windows NT, and OS/2. Other PVCS platforms (supported by Synergex) include Alpha NT, Alpha Open VMS, Apple Macintosh, Bull DPX2, Digital RISC Ultrix, Digital Unix (OSF/1), DG Avion, HP-9000, IBM RS6000, ICL Linux, Mips, Pyramid Nile and S/T series, QNX, SCO Unix, Sequent, Siemens-Nixdorf, Silicon Graphics Stratus, Sun, SVR4 iAPX, Unisys U6000 UnixWare, VAX Open VMS, and VAX Ultrix. A gateway to MVS is also available.

PVCS has strong network support, too. Artisoft's LANtastic, Banyan's VINES, FTP, TCP/IP, IBM LAN Server, Microsoft LAN Manager, Windows for Workgroups, Windows NT Advanced Server, and Novell's NetWare are all supported. PVCS's extensive security works closely with network operating systems to

guard against unauthorized access. For networks not directly supported, Intersolv provides utilities for obtaining user IDs.

Like the other products in this review, PVCS uses a hierarchical project model for organizing work. The project is the main unit of organization, and items are grouped in folders underneath it. Unlike the other products, however, PVCS organizes work logically rather than physically. An archive, for example, is a logical grouping that represents a file and its history. The archive includes all revisions together with information on who made changes, what the changes were, and why they were made. Folders are also logical units. When you set up a project, you have the option of setting up folders for each archive directory, for each filename extension, or for each workfile directory—or not to use folders at all. Classifications are made irrespective of any physical location on the disk. Items viewed within a folder may be spread all over the network. This feature gives the product enormous flexibility but also adds to its complexity. At some point someone has to map these logical entities to physical ones.

The main Version Manager user interface is the Project Window. When you first log on, the Master Project Window is displayed. The Master Project doesn't correlate to any real projects. It is used as a configuration template for generating other projects. Each project has its own Project Window, which is displayed when you open that project. You can have multiple projects open at one time and share files among projects.

A Project Window is divided into three panes. On the left, the folders list shows the project, represented by a project folder icon on

similar list formats are used to represent different constructs—one logical and the other two physical. You rarely need to see the physical location of files in an archive—usually just when you are checking them in for the first time—so there isn't a good reason to be constantly reminded of the mismatch. Also, although the icons representing various logical entities are distinct, they are not very intuitive. On the plus side, the interface makes good use of direct manipulation of objects to perform work. You can click on multiple archives in the folders list, for example, and drag them to the toolbar's check-out icon to work on them. The toolbar contains all of the standard version-control functions and then some.

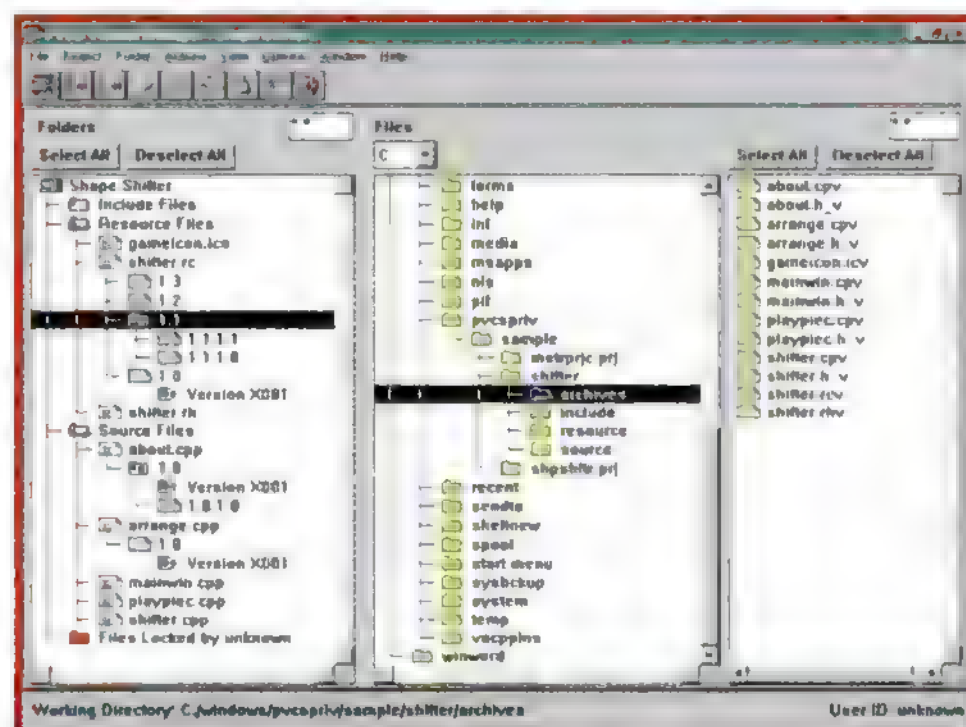
One PVCS feature not available in the other products is support for *promotion groups*. A promotion group is one level in a hierarchy called a *promotion model*, which represents major milestones in a project—moving from development into testing, for example. In a promotion model, you promote archives to a higher group when they reach a milestone and demote them when they need to go back for more work. In PVCS, the only promotion group that allows revisions is the Development group. If, for example, an archive goes into testing and bugs are found, you have to demote it back to the Development group in order to fix them. This is a nice feature, since it gives you a good picture of where the project stands, as well as an extra measure of control.

Extra control is intrinsic to PVCS. When you open a new project, a Project Assistant prompts you through the configuration options, which are numerous. You can customize a configuration for specific networks, applications development tools, and file types. De-

faults are set in the Master Project and can be changed on a project-by-project basis if the options have not been disallowed in the Master Project. Several categories of options are provided, including allow/disallow, archive searching, branching, compression, formats, and event triggers. And you have several options within these categories. For example, compression options, such as Changes, Workfile Copy, and Store Deltas, allow you to select a file extension and specify what may be compressed. You can even tell PVCS to mask or renumber

line numbers when comparing programs.

Of course, having so many options makes using the product more complicated, but if you need the kind of fine-tuned control and enterprise-wide, cross-platform support that PVCS offers, it's worth the learning curve.



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PVCS Version Manager 5.2.20. List price: \$599. Intersolv Inc., Rockville, MD; 301-838-5000; fax, 301-838-5432; www.intersolv.com. Circle 457 on reader service card.

StarBase Corp.

StarTeam Workstation

StarBase Corp.'s StarTeam Workstation 2.0 (\$549) provides an integrated set of tools that handle not just version control but also other change management functions. StarTeam Workstation includes version control, defect tracking, threaded conversations, build management, audit logs, charting, reporting, and a project repository, all accessible from one elegant interface. The intuitive design and smooth integration make this a highly productive environment. And with so much functionality under one roof, StarTeam Workstation is the best value of any of the three products reviewed here.

Available only on Windows 95 and Windows NT, StarTeam Workstation lacks the platform support offered by PVCS or SourceSafe, but StarBase does provide cross-platform accessibility to StarTeam repositories via Web browsers in its Web Connect product, sold separately for \$949.

Out of the box, StarTeam Workstation can be used as a standalone tool or can share files on a LAN in file-server mode. Supported networks include Artisoft's LANTastic 5.0, IBM LAN Server 3.0, Microsoft LAN Manager 2.1, Microsoft Windows Network, Novell's NetWare 3.11, and TCP/IP. File-server access would not be practical for remote users, however, or on heavily trafficked or low-bandwidth LANs, so StarBase offers StarTeam Server (\$949.00), to be used in conjunction with StarTeam Workstation as client. This configuration minimizes network overhead and allows distributed development teams to work on a WAN. It also gives mobile users dial-in access. StarTeam Server supports NetBIOS/NetBEUI, TCP/IP, and Named Pipes protocols. The StarTeam architecture is flexible and scalable. The database can be accessed locally by StarTeam Workstations or shared by StarTeam Web Connect and StarTeam Server products.

The main StarBase Workstation operating environment is the Project Tree. (A command line interface is also available.) Much like Windows Explorer, the Project Tree consists of two panes. The one on the left shows a hierarchical view of the project. A project folder appears at the top of the tree, and its associated files and subprojects, also depicted as folders, are listed on the branches beneath it. The tree corresponds to directories in the repository vault. As with regular directory trees, the branches can be expanded or collapsed to different levels of detail by clicking on the plus or minus signs, respectively. Any number of subprojects may be nested within

others, and you can drag and drop files and directories within the tree.

Clicking on a file or subproject in the left pane will display correlative information in the right. At the bottom of the right pane, a set of tabs—Files, History, Defects, Topics, Team, Audit—let you switch between views of the project. Clicking on History, for example, displays the revision history of the selected project-tree item. Clicking on Defects displays a synopsis of any reported problems associated with it. Depending on the tab, different icons representing the status of each item are also displayed. And when you select a tab, a corresponding menu will appear on the menu bar as well.

The interface is very easy to use. You can set a filter, specify sorting criteria, or limit the scope of information, mostly by pointing and clicking. And well-designed icons convey important information at a glance. The StarTeam Project List provides a natural, intuitive approach to organizing and managing a considerable amount of detail.

Behind the scenes, StarTeam Workstation supplies all the basic version-control functions, such as file check-in/check-out, locking, branching, merging, comparing, and versioning. Like

MAPI-compliant e-mail system, such as Microsoft Mail, can be plugged in.) StarTeam Workstation sets up a relationship between the thread and the project and tracks the message and its responses in a topic tree. You can access topic trees via the Topics tab of the Project Tree. Each tree displays the initial topic message as its root and all subsequent responses as branches. Anyone who wanted to read the threads related to a bug fix, for example, could click on the item in the Project tree list and select the Topics tab. Threaded conversations encourage online interchange of ideas between team members, and they provide a useful way of documenting specific issues affecting a project, but they do not impose any controls on the process.

Bug fixes bring up another important difference between StarTeam Workstation and the other products in this roundup. Bugs have a direct impact on revisions, so it makes sense to integrate defect tracking closely with version control, but StarTeam is the only one that does it. Intersolv's PVCS Tracker handles defect tracking, but it is not integrated with PVCS Version Manager, and Microsoft Visual SourceSafe uses a third-party tool. StarTeam Workstation, on the other hand, handles defects seamlessly within the context of regular work. Clicking the

Defects tab in the Project Tree lets you view any defects entered for the list item and enter new ones. The Defect List includes a synopsis of the problem; the defect's status, priority, and severity; and which builds tested and addressed the problem. Since build management is also integrated into the product, it is easy to correlate bug fixes with builds.

StarTeam Workstation provides not only a defect-tracking mechanism but also tips on defect process management. In fact, much of the documentation provides conceptual frameworks and suggested processes. Over-

all, the documentation and online help are educational. The only complaint we have is that the online StarTeam Workstation tutorial requires a sound card, and no alternatives are available for users who don't have one. Since sound cards are not required to run the product, it seems odd that StarBase would require one for the tutorial.

If you want value, ease of use, and one-stop shopping for your change management needs and you can live without strict security controls, StarTeam Workstation is a bargain. □

StarTeam Workstation 2.0. List price: \$549. StarBase Corp., Irvine, CA; 888-782-7700, 714-442-4400; fax, 714-442-4404; www.starbasecorp.com. Circle 459 on reader service card.

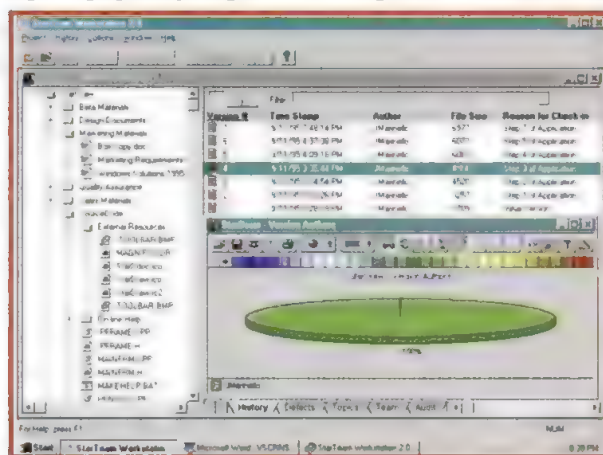


FIGURE 3: StarTeam Workstation's Project Tree displays a project and its related files. A charting feature graphically displays the percentage of versions checked in by each author.

the other products, it uses visual difference checking to resolve conflicts. It also provides basic administrative functions. Compared with PVCS, however, StarTeam Workstation's administrative capabilities and security features seem meager. For security, it provides password protection and access privileges but little else. Apparently that is the result of a philosophy of project management that relies more on team collaboration than on centralized control to deal with problems.

StarTeam Workstation's threaded conversation feature is a good example. A team member starts a thread on a topic relevant to a particular project component by sending an e-mail message via StarTeam's e-mail interface. (Any

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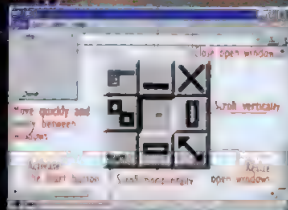
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By Jeff Prosise

Building Applications with Visual C++, Part 3

Now it's time for our sample program to come to life.

This is the third in a series of articles detailing the steps involved in creating a version of tic-tac-toe with Microsoft Visual C++. In the first article, we used AppWizard to generate a source code skeleton. In the second, we added code to the view class's OnDraw function to draw a 5-by-5-square playing grid and used ClassWizard to write a mouse-event handler that pops up a message box when a user left-clicks on a square. This time we'll modify the application's document class (CTicDoc) to keep a record of the X's and O's the user enters.

Start Visual C++ and open the project containing the application's source code files. Make sure the Project Workspaces window is visible, and click the ClassView tab to display a list of the classes used by the application.

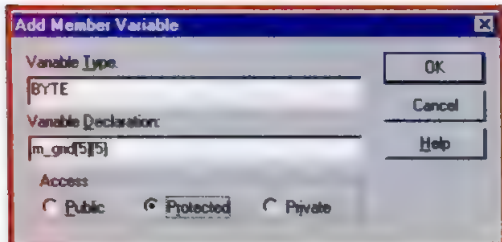


FIGURE 1: Adding `m_grid` to the document class.

STORING X'S AND O'S

In a typical Visual C++ application, data is stored in a document object and pictorial representations of that data are rendered by a view object. AppWizard has derived nothing document and view classes for us from MFC's `CDocument` and `CView` classes, and we have modified the view class to produce simple screen output.

Storing X's and O's is the job of the document, so let's begin this installment by giving our document that capability. We'll add a member variable—a 5-by-5 array of bytes named `m_grid`—to our document class. Each element in the array will represent one square in the playing grid. We'll initialize the array elements to 0, to indicate that all the squares are empty. When a user enters an X or O, we'll set the corresponding array element to 1 or 2, respectively. Rather than allowing the view to access `m_grid` directly, we'll add a pair of public member functions named `AddX` and `AddO` to place X's and O's in the grid. (In the next issue, we'll

modify the view's `OnLButtonDown` handler to use these functions.)

We could add the `m_grid` array to `CTicDoc` by editing the header file `TicDoc.h` directly, but there's an easier and more visual way to do it in Visual C++. In the list of classes shown in the Project Workspaces window, right-click on `CTicDoc` and select `Add Variable` from the context menu. Fill out the `Add Member Variable` dialog box, as shown in Figure 1. Be sure to click the `Protected` radio button, so `m_grid` will be declared protected. In C++, a protected member can't be accessed from outside of the class in which it has been declared. That's why we'll provide public member functions that other classes can use to access the data in the document's playing grid. Hiding `m_grid` inside the document class and forcing other classes to access it through public member functions protects the integrity of the document by allowing *only* the document to decide what values get written to the array. Finally, click the OK button to add `m_grid` to the document class.

You can verify that `m_grid` was added by browsing the list of `CTicDoc` function and data members in ClassView; look for an icon labeled `m_grid`. Double-clicking on the icon will take you to the line in `CTicDoc.h` where `m_grid` is declared.

The next step is to initialize `m_grid`'s array elements to 0. In a conventional C++ application, data members are initialized in the class constructor. In an SDI (Single-Document Interface) Visual C++ application, however, the document and view objects are created

```
BOOL CTicDoc::OnNewDocument()
{
    if (!CDocument::OnNewDocument())
        return FALSE;
    for (int i=0; i<5; i++)
        for (int j=0; j<5; j++)
            m_grid[i][j] = 0;
    return TRUE;
}
```

FIGURE 2: `CTicDoc::OnNewDocument`, with code to initialize `m_grid`.

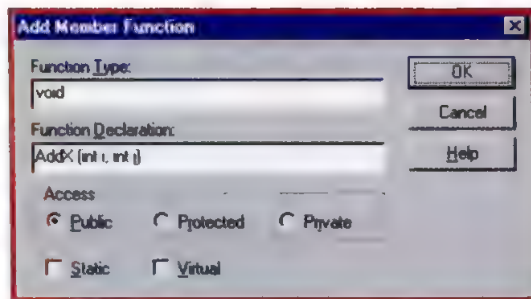


FIGURE 3: Adding an `AddX` function to the document class.

once—at the outset of the program—and reused again and again as documents are opened and closed. If `m_grid` were initialized in the document's constructor, it would be initialized only once. Since we want `m_grid` to be reinitialized whenever a new game is started, we'll add the initialization code to the class's `OnNewDocument` function. `OnNewDocument` is a `CDocument` virtual function that's called each time a new document is created. AppWizard has already overridden it for us in `CTicDoc`, so all we have to do is add code to initialize the array. Here's how:

First, find `OnNewDocument` in ClassView's list of `CTicDoc` member functions and double-click on it to open the source code for `CTicDoc::OnNewDocument`. Then add the line beginning for in Figure 2, which shows the complete `OnNewDocument` function.

INSERTING X'S AND O'S

Now that we've added and initialized `m_grid`, let's write the functions the view will use to add X's and O's to the array. We'll let ClassWizard generate the function prototypes for us, and then we'll add the code to modify the individual array values.

Right-click on `CTicDoc` in ClassView and select `Add Function` from the context menu.

In the `Add Member Function` dialog, type "void" into the Function Type box and "AddX(int i, int j)" into the Function declaration box (see Figure 3). Make sure the `Public` button is selected in the Access box, and click OK.

Add the lines

```
if ((i >= 0) && (i <= 4) &&
    (j >= 0) && (j <= 4))
    m_grid[i][j] = 1;
```



```

void CTicDoc::AddX (int i, int j)
{
    if ((i >= 0) && (i <= 4) && (j >= 0) && (j <= 4))
        m_grid[i][j] = 1;    // Add an X to the grid
}

void CTicDoc::AddO (int i, int j)
{
    if ((i >= 0) && (i <= 4) && (j >= 0) && (j <= 4))
        m_grid[i][j] = 2;    // Add an O to the grid
}

```

FIGURE 4: *CTicDoc's AddX and AddO functions.*

```

BYTE CTicDoc::GetSquare (int i, int j)
{
    if ((i >= 0) && (i <= 4) && (j >= 0) && (j <= 4))
        return m_grid[i][j];
    return (BYTE) -1;
}

```

FIGURE 5: *The CTicDoc::GetSquare function.*

to `CTicDoc::AddX`. Notice that the row and column numbers passed into the function are range-checked. This check isn't absolutely essential, since we know our view won't be passing any out-of-range values. But a well-designed document class should be able to work with other views as well as our own, and other views might not be so well-behaved.

Repeat the procedure to add an `AddO` function to the document class, but this time set `m_grid[i][j]` to 2 instead of 1. The completed source code for `CTicDoc::AddX` and `CTicDoc::AddO` is shown in Figure 4.

THE CTICDOC::GETSQUARE FUNCTION

We've now added an array to the document class for storing X's and O's and public member functions for adding values representing X's and O's to the array. Before filling a selected square, however, the view must verify that the square is empty. Use the following procedure to add to the document class a public member function named `GetSquare`, through which the view can retrieve the contents of the square at a given row and column:

Right-click on `CTicDoc` and once again select `Add Function` from the context menu.

In the `Add Member Function` dialog, specify "BYTE" for the function type and "GetSquare (int i, int j)" for the function declaration. Then click OK to create the function.

Add the following statements to the body of `CTicDoc::GetSquare`:

```

if ((i >= 0) && (i <= 4) &&
    (j >= 0) && (j <= 4))
    return m_grid[i][j];
return (BYTE) -1;

```

The complete function is shown in Figure 5.

Given a valid row and column number, `GetSquare` returns 0 if the square is empty, 1

if it contains an X, or 2 if it contains an O. A return value of -1 signifies an invalid row or column number.

WHOSE TURN IS IT?

Our document class is almost complete, but there's one detail we have yet to address: How does the view know whether to add an X or an O to an empty square? Somewhere in our application we need to keep a record of whose turn it is. Ultimately, this information will have to be saved along with the contents of `m_grid` when a document is saved to disk. Otherwise, the application won't know whose turn it

is when a saved game is reloaded.

To keep a record of who's next, let's create a member variable named `m_bXsTurn`; we'll set it to `TRUE` when it's X's turn or `FALSE` when it's O's. Since `m_bXsTurn`, like `m_grid`, is a part of our application's data, we'll make it a member of the document class. We'll set it to `TRUE` in `CTicDoc::OnNewDocument`, and we'll set it to `FALSE` when an X is added to the document and `TRUE` when an O is added. Here are the steps:

In `ClassView`, right-click on `CTicDoc`, choose `Add Variable`, and add a protected `BOOL` (Boolean) member variable named `m_bXsTurn` to the document class. Initialize `m_bXsTurn` to `TRUE` in the document's `OnNewDocument` function.

Add a statement to `CTicDoc::AddX` that sets `m_bXsTurn` to `FALSE` after an X is added to `m_grid`. Similarly, modify `CTicDoc::AddO` to set `m_bXsTurn` to `TRUE` after an O is added.

In `ClassView`, right-click on `CTicDoc`, choose `Add Function`, and create a public member function named `IsItXsTurn` that returns the value of `m_bXsTurn`.

The modified source code for `OnNewDocument`, `AddX`, `AddO`, and `IsItXsTurn` is shown in Figure 6. The document now remembers who's turn it is, and it automatically toggles `m_bXsTurn` when an X or O is added to `m_grid`. Moreover, the view can find out whose turn it is by calling the document's `IsItXsTurn` function. A nonzero return value means it's X's turn; a 0 return means O comes next.

SO FAR, SO GOOD

`CTicDoc` is now a functional document class. It includes public member functions for adding X's and O's to the playing grid, retrieving the contents of a specified square, and finding out whose turn it is next. The document's data is stored in protected member variables that are accessible only through the associated member functions.

In Part 4, we'll marry the document and the view so that clicking on an empty square produces an X or O on the screen and records it in the document's `m_grid` array. We'll also modify the view's `OnDraw` function so that it draws an accurate rendition of the playing grid, complete with X's and O's. With that, the application will be almost complete, lacking only the finishing touches. □

Jeff Prosise is a contributing editor of PC Magazine and the author of Programming Windows 95 with MFC, published by Microsoft Press.

```

BOOL CTicDoc::OnNewDocument()
{
    if (ICDocument::OnNewDocument())
        return FALSE;

    for (int i=0; i<5; i++)
        for (int j=0; j<5; j++)
            m_grid[i][j] = 0;

    m_bXsTurn = TRUE;
    return TRUE;
}

void CTicDoc::AddX (int i, int j)
{
    if ((i >= 0) && (i <= 4) && (j >= 0) &&
        (j <= 4)) {
        m_grid[i][j] = 1;    // Add an X to.
                               // the grid
        m_bXsTurn = FALSE;  // O comes next
    }
}

void CTicDoc::AddO (int i, int j)
{
    if ((i >= 0) && (i <= 4) && (j >= 0) &&
        (j <= 4)) {
        m_grid[i][j] = 2;    // Add an O to
                               // the grid
        m_bXsTurn = TRUE;   // X comes next
    }
}

BOOL CTicDoc::IsItXsTurn ()
{
    return m_bXsTurn;
}

```

FIGURE 6: *The complete OnNewDocument, AddX, AddO, and IsItXsTurn functions.*

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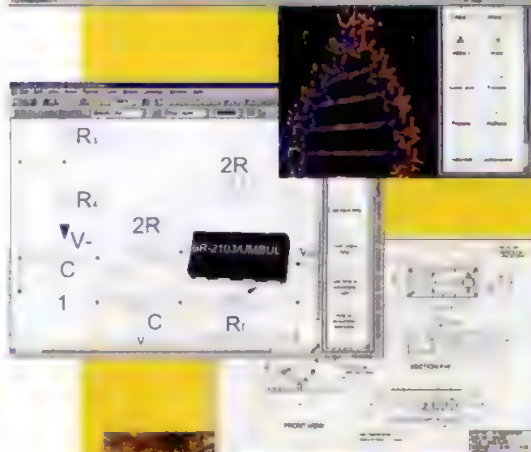
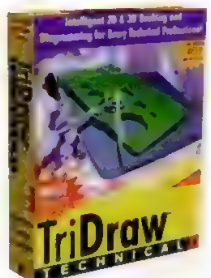
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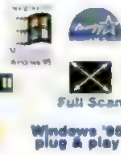
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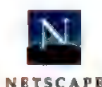


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PC Tech/Power Programming

By Zan Oliphant

Programming CGI in C

A sample program shows you how to respond to user input.

Sometime last year, a friend and I were sitting around trying to think of a great Web-based Internet service that would make us rich beyond our wildest dreams. We managed to come up with a number of ideas, from a virtual dating service to a restaurant search engine, but none seemed promising enough to justify us quitting our jobs. I suspect many other people have gone through this same thought process.

Of our ideas, one that we did discuss in some detail was the restaurant search engine. Our Web page would allow users to search for a particular cuisine, price range, location, and quality. We planned to make our money by charging local eateries for exposure on our page, in addition to running regular Web-style ads. As for the technical side, we would build a database that lived on a Web server and that users could query via a forms-based Web page. The project would require building a Common Gateway Interface (CGI) program to handle the database queries.

For this article, I decided to resurrect our ill-fated restaurant search engine idea as a learning tool for an extremely small CGI program written in C. The CGI specification

compiled with most Unix C compilers, and another portion in HTML, for the Web page interface.

A Web server is a program that runs on a computer connected to the Internet. Its job is to listen on a predefined TCP/IP port for client requests and then fill Web browsers with content based on those requests. When you type a Universal Resource Locator (URL) into your browser, that URL is mapped to an IP address and port corresponding to a specific Web server. After a connection has been established, the client and server communicate using the HyperText Transfer Protocol (HTTP). Typically, the Web server delivers a block of text written in the HyperText Markup Language (HTML) to the browser, which parses the HTML and may request additional content, such as graphical data. The model works well for static data, but what about live data? For example, how would a Web server deliver content that it generates based on user input?

A CGI program is the answer. The Web server executes a CGI program as a separate process to fulfill a user's request, which can be as simple as a Web page hit counter or as complex as a database query. Because a CGI program is external to the Web server, it can be written in virtually any language, whether compiled or interpreted. Popular languages for CGI are Perl, C, and even Unix shell scripting. Some Web servers provide libraries and interpreters for Java and Visual Basic for use by CGI programs.

Because CGI programs are language- and platform-independent, the Web-server-to-CGI interface is generic. There are three basic interfaces: standard input, standard output, and environment variables. Standard input and output, or `stdin` and `stdout`, are a command line program's fundamental means of communication with the outside world. Usually, `stdin` comes from the computer's keyboard and `stdout` is directed to the screen. But when a Web server executes a CGI program, it redirects the program's `stdin` to read from the

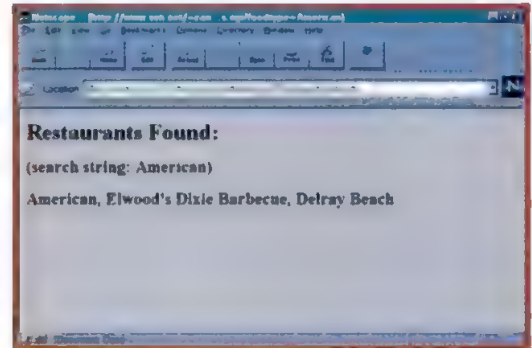


FIGURE 2: This Web page was generated by the CGI script in Figure 3, using the answer obtained from the Web form in Figure 1.

server and directs the CGI program's `stdout` back to the server.

Environment variables are also used to feed information to a CGI program. You may remember using plenty of environment variables, such as `PATH`, while setting up older versions of DOS. Let's take that one step further, without getting too deeply into the specifics of HTTP. A CGI program is invoked indirectly through the server by the browser, with either a GET or POST HTTP request method. Your CGI code must examine a `REQUEST_METHOD` environment variable to determine whether the request was a GET or a POST and thus how to get the data coming from a user's interaction with a Web page. The environment variable is created by the Web server before your CGI program is executed. For the POST method, the data will come via standard input, while with the GET method, data will reside in the environment variable `QUERY_STRING`.

Why the difference? A request using the GET method passes variables by embedding them in the URL. This technique is called *URL encoding*, and the portion of the URL that encodes variables always starts with a question mark. This portion of the URL is passed to the CGI program as the environment variable `QUERY_STRING`. Each variable is expressed as an ordered pair of the form `name=value`.

For example, if I enter my name in a Yahoo! search, the request is translated into a URL:

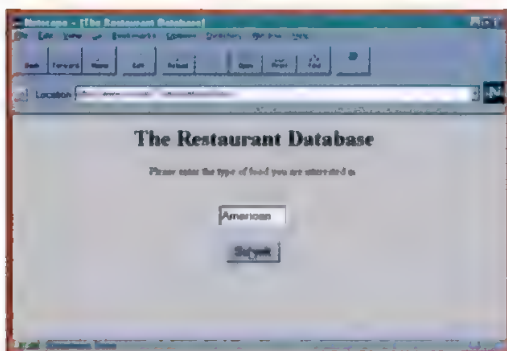


FIGURE 1: This simple form Web page can be used in conjunction with the CGI script in Figure 3 to generate the answer Web page shown in Figure 2.

is a pivotal topic among those who build serious Web sites. CGI's importance lies in its ability to make Web pages interactive, not in what a great technical achievement a CGI program might be. In fact, most CGI programs, or *scripts*, are small and simple. Our example consists of one portion written in the C programming language, which can be

http://av.yahoo.com/bin
/search?p=Zan+Oliphant

The URL tells the receiving CGI program that the variable p should get the value "Zan Oliphant." Also part of URL encoding are a number of special characters:

- + Data separator or space
- = Joins names with values for ordered pairs
- % Combines ordered pairs
- % Hexadecimal value follows in %XX format

Here's an example that uses them:

Food=American&Price=High+to
+Medium&Location=10+Miles+%2b

The percent sign near the end is followed by an ANSI character number, in hexadecimal form. In this case, it's being used to encode the plus sign, because of the sign's special meaning in URL encoding. The string encodes these three variables:

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

int GetRestaurant ();

/*
 * main
 */
void main ()
{
    char *pQuery;

    /* Turn off stdout buffering */
    setvbuf (stdout, NULL, _IONBF, 0);

    /* Get the QUERY_STRING */
    pQuery = getenv("QUERY_STRING");

    /* Strip the first part of the name=value pair */
    if (pQuery = strchr(pQuery, '='))
        pQuery++;

    /* Get the requested type of restaurant */
    GetRestaurant (pQuery);
}

/*
 * GetRestaurant
 */
int GetRestaurant (pType)
char *pType;
{
    FILE *fp;
    char Line[256];
```

Food	American
Price	High to Medium
Location	10 Miles +

Putting user data directly into the URL will work only for small items that will fit into the size limit of a URL. For a larger amount of data, use the POST method, which can send an unlimited amount of data because the data is not embedded in the URL. Within your CGI program, POST data is retrieved from standard input after reading the environment variable CONTENT_LENGTH to get the data size. (For this article, I chose to use the GET method in order to keep the example simple.) When the CGI program finishes processing the user data and is ready to respond, it simply writes the results to standard output. The results must be in a format the Web browser understands. Later, in the example code, you will see how the C language printf function is used to generate on-the-fly HTML.

THE EXAMPLE

Looking at Figure 1, you'll see my Web page is not going to win any creativity awards. But

it will serve the purposes of our example. The page consists of a text entry field with an associated Submit button. A user of my restaurant search engine has the choice of three types of food: American, Chinese, and Italian. Upon entering one of these choices, the user sends the text from the browser to the Web server, and the server executes the CGI program. Here is the HTML source code for the Web page:

```
<HTML><HEAD>
<TITLE>The Restaurant Database</TITLE>
</HEAD>
<BODY>
<CENTER>
<H1>The Restaurant Database</H1>
Please enter the type of food you are
interested in:
<HR>
<FORM METHOD = "GET" ACTION = "cgi-
bin/eateries.cgi">
<INPUT TYPE="text" NAME="foodtype"
SIZE=10>
<HR>
<INPUT TYPE="submit" Value="Submit">
```

```
/* Print the HTML header */

printf ("Content-type: text/html\n\n");
printf ("<html>\n");
printf ("<body>\n");
printf ("<h1>Restaurants Found:</h1>\n");
printf ("<h2>(search string: %s)</h2>\n", pType);

if (pType)
{
    /* Open our database */

    if (!(fp = fopen ("eateries.dat", "r")))
        return -1;

    /* Find the requested restaurant type */

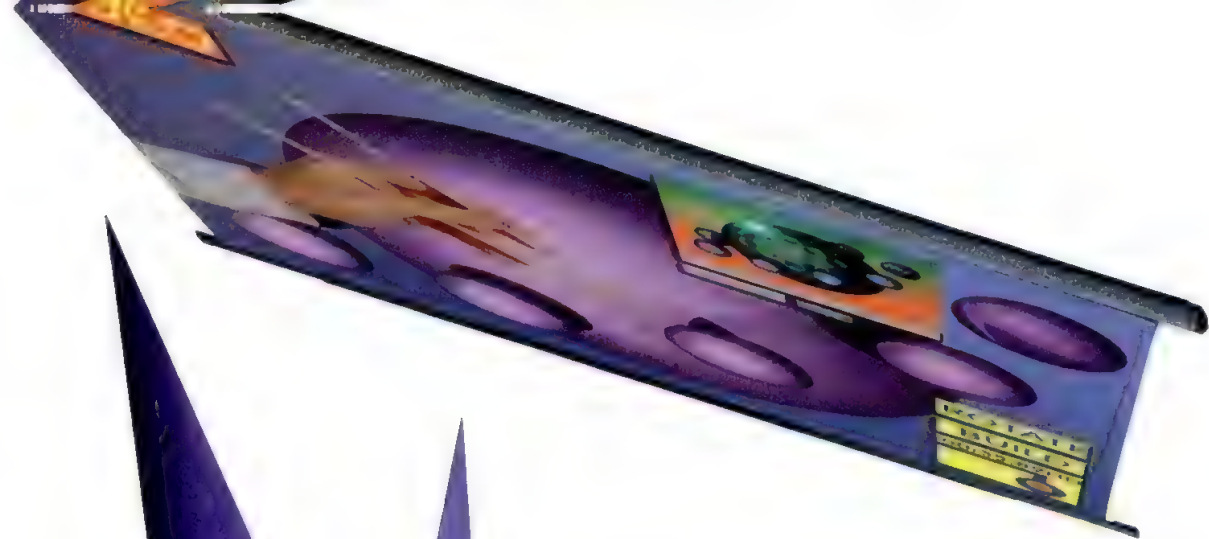
    while (fgets(Line, sizeof(Line), fp))
    {
        if (strstr(Line, pType))
        {
            printf("<h2>%s</h2>\n", Line);
            break;
        }
    }
    fclose (fp);
}
else
    printf ("Invalid Query!\n\n");

/* HTML trailer stuff */

printf ("</body>\n");
printf ("</html>\n");
}
```

FIGURE 3: This is the C code for our restaurant-selection example CGI script.





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```
<HR>
</CENTER>
</BODY>
</HTML>
```

Take a look at the `<FORM>` tag in the middle of the HTML code. Within this tag, we specify the GET method and set ACTION to our CGI program: `eateries.cgi`. That tells the browser to use an HTTP GET request to send data to the CGI program named by ACTION. Next, the `<INPUT>` tag is used to create a text entry field (`TYPE="text"`) named `foodtype` (`NAME="foodtype"`). Finally, a submit button is created with another `<INPUT>` tag specifying `TYPE="submit"`. In Figure 2, you can see the results of this HTML code when *American* has been placed into the entry field. (For a real-world implementation, it would be better form design to use a drop-down control that limits the user's choices to the types of cooking we support.)

To get these results, the CGI program had to query a flat data file called `eateries.dat`. Here is that file in its entirety:

```
American, Elwood's Dixie Barbecue,
          Delray Beach
Chinese, Orient Palace, Boca Raton
Italian, Giovanni's, Boyton Beach
```

Take a look at the C code that was used to

make it happen, which is shown in Figure 3. This code works under Unix and Windows NT. Looking in the `main` routine, the first thing you'll notice is that `stdout` buffering is turned off with a call to `setvbuf`. That's done to ensure that the Web server gets our CGI output as soon as it is printed to `stdout`. Then a pointer to the environment variable `QUERY_STRING` is retrieved via the C library call `getenv`. (Because our CGI application knows it will always be called with an HTTP GET request, it doesn't bother checking the `REQUEST_METHOD` environment variable.) Next, we take another shortcut for the sake of code simplicity. We've limited our program to accept only three different query strings:

```
Foodtype=American
Foodtype=Chinese
Foodtype=Italian
```

`Foodtype`, as you may remember, is from the `INPUT` tag in the Web page's HTML code. To parse the string, we scan in the first character after the equal sign using a call to `strchr` and then increment the character pointer by one. I don't recommend using this technique for your CGI programs, as it doesn't handle spaces or other special URL characters—but again, it serves the purpose of this example.

It would be preferable to parse the query method, allowing for special URL encoding characters, as mentioned earlier. After this simple parsing, `pQuery` points to whatever the user has typed in the entry field. The pointer is sent as a parameter to the `GetRestaurant` routine.

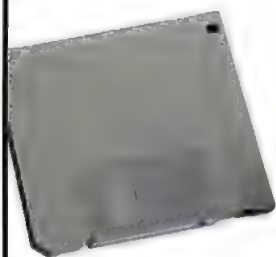
The first thing `GetRestaurant` does is print the MIME (Multipurpose Internet Mail Extensions) type to standard output. The MIME type tells the Web server what kind of data it should expect from the CGI program. In this case, it's `text/html`, but it could be any other MIME type the server can handle. After the MIME type, a regular HTML header is printed. Notice that the user data is echoed back to the user with the following `printf` call:

```
printf("<h2>(search string:
%s)</h2>\n", pType);
```

Once the HTML header is printed, the data file is opened with a call to `fopen` and scanned with `fgets`. Each line is checked with `strstr` for the search string the user entered. If the substring is found, the whole line is printed to `stdout`:

```
printf("<h2>%s</h2>\n", Line);
```

and processing of the file stops. If no query



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Power Programming

string was entered, an error message is printed. Finally, the HTML is closed up with

```
printf ("</body>\n");
printf ("</html>\n");
```

Here's the complete CGI-generated HTML code that produced the screenshot in Figure 2:

```
<html>
<body>
<h1>Restaurants Found:</h1>
<h2>(search string: American)</h2>
<h2>American. Elwood's Dixie Barbecue,
Delray Beach</h2>
</body>
</html>
```

RUNNING THE SAMPLE

To run this sample, you can download the source code from PC Magazine Online. (See the sidebar "Getting the Files" in this issue's Utilities column for downloading instructions.) You will need access to a Web server machine and its associated C compiler. Additionally, you'll need private CGI capabilities on the Web server. If you don't know what I'm talking about and you don't have your own Web server, ask your Internet service provider (ISP) whether it allows private CGI scripts (or programs) and whether you have access to a C compiler through telnet. Some ISPs provide these services; others don't.

Once you get the source code compiled, name the executable `eateries.cgi` and put it in whatever directory is appropriate for your Web server's CGI area. Some Web servers have a specific area for CGI programs; others allow CGI programs in any directory. The ISP I'm using to test my sample code is running the Apache Web server on Linux. That setup allows me to log on via telnet and to create a `cgi-bin` directory under my `public_html` directory. I put `eateries.cgi` in `~zan/public_html/cgi-bin` and `eateries.html` in `~zan/public_html`. Assuming the access permissions are correct for all files and directories, I can type the following into my browser:

```
http://www.svn.net/~zan/eateries.html
```

You can see the results in Figure 1. I hope you find the techniques here useful in adding power to your Web site. □

Zan Oliphant (zan@gate.net) is president of Zan Software (www.gate.net/~zan), a developer of Webmaster utilities for Windows 95 and Unix systems. He is also the author of Programming Netscape Plug-ins (Sams.net Publishing).

Thanks to Chris Shablak for help on the restaurant search engine.

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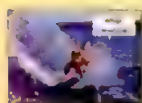
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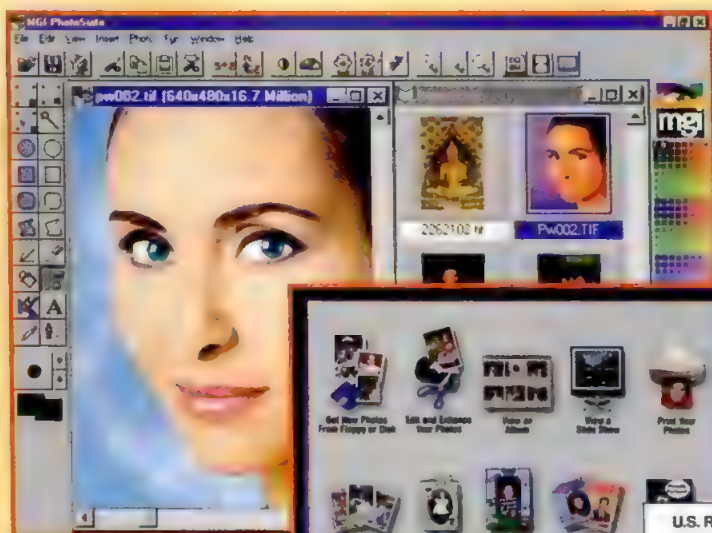
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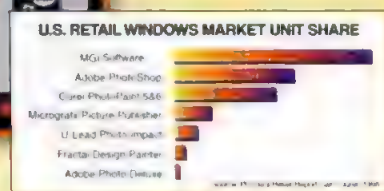
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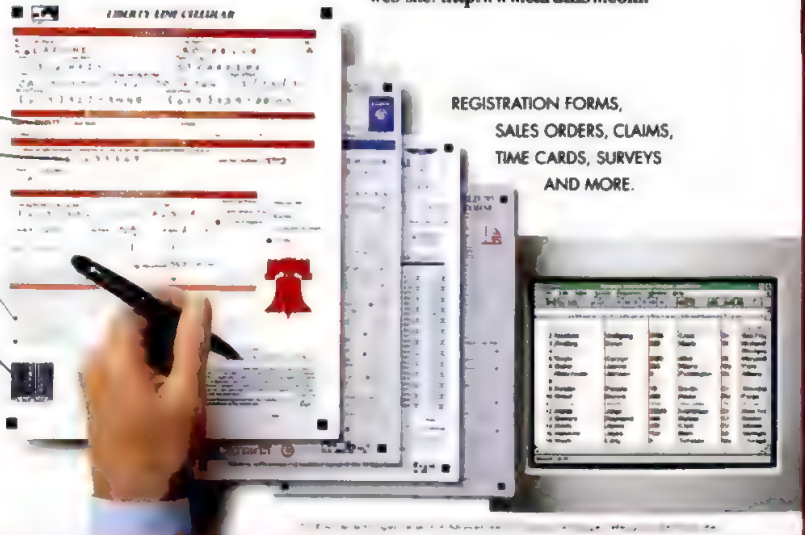
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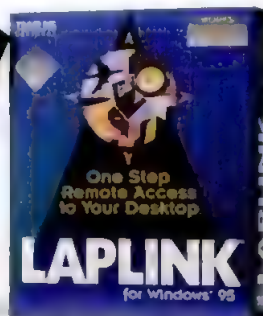
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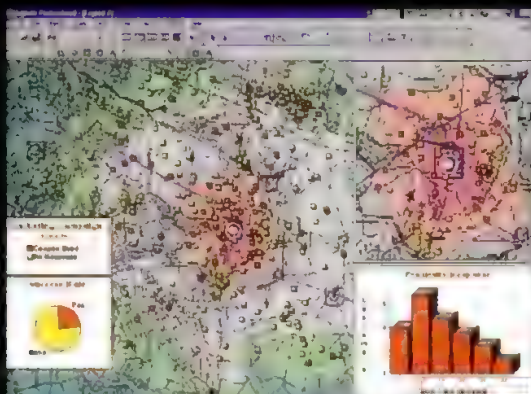


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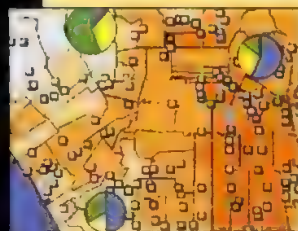
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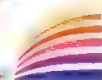


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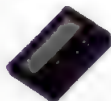
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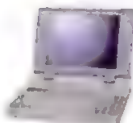
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PC Tech/Operating Systems

By Neil Randall

Installing 32-Bit Programs under Windows 95

The role of the registry in setting up applications.

It used to be so straightforward. Pop in the floppy disk, make a directory on the C: drive, then copy the files from A: to C:. There. You've just installed a piece of software.

But that was then, and this is now. Some similarities remain between doing an installation in DOS and doing one in Windows 95, but a great many complexities have crept in along the way. Of course, the little scenario above was rarely encountered even in DOS, because not long after the introduction of hard disks, programs started spanning multiple floppy disks. The result was a ubiquitous program called INSTALL.EXE, which created a new directory on your hard disk and copied all the files into that directory for you.

Installation programs soon became the norm. By the time Windows 3.0 came along, INSTALL.EXE had been renamed setup.exe, and that program blithely created multiple new directories, eagerly placed an initialization (.INI) file in the \windows directory, and unceremoniously dumped dynamic link library files (DLLs) into the windows\system directory. With Windows 95, things got even more complex and, in the process, more hidden from the user. Although Windows 3.x's .INI files were anything but secure—they were neither read-only nor hidden, and as a result they were always susceptible to deletion—at least they were easy to find and, if necessary, edit. Windows 95, by contrast, uses the Registry to store information, and although the sanctity of the information has improved considerably, using the Registry takes steady hands, a strong stomach, and no small amount of technical savvy.

INSTALLATION REQUIREMENTS

You can still install 16-bit Windows 3.x applications in Windows 95. Essentially, they're handled as they always were, with .INI files being created and DLLs making their way into c:\windows\system. Where things start to get interesting is with the 32-bit programs, because Microsoft has established a set of installation requirements that must be

met if the application is to be granted the right to display the Windows 95 logo. For instance, an application has to be compiled with a 32-bit compiler (which means there's no way for 16-bit programs to become official Windows 95 programs). It must adhere to the guidelines for Windows 95 installations, and it must include an uninstaller. An application has to support and display Windows 95's long filenames and icon attachments to file types, and it's supposed to hide file extensions pertaining to the program (although whether the extensions are actually hidden depends on how the user configures Windows Explorer). Those are the main requirements for installation, but there are many more. For instance, a program must be installable in Windows NT 3.51 and 4.0, it must recognize Plug and Play events, such as adding or removing hardware, and it has to use the official Windows 95 user interface, as established by Microsoft.

The installation guidelines for 32-bit software are quite demanding. First, before the

two main Windows 3.x initialization files, win.ini and system.ini. Instead of using those files, the installer must store information about itself in the Windows 95 Registry. The installation program must allow a user to stop an installation at any time, and if that happens, any changes or additions must be undone, so the system will be left exactly as it was before the installation began. Finally, users must be shown a progress meter that lets them know how much of an installation has been completed, and they must be given a choice of typical or custom (and perhaps other) installation types.

If you're planning to publish a piece of Windows 95 software, a program such as InstallShield (www.installshield.com), which is used by most major publishers, lets you produce a valid installation quite effortlessly. You're given a checklist of items you need to specify and others you can include or leave out, and once you've gone through the list, InstallShield puts everything together and helps

you save the entire package onto floppy disks or CD-ROM, ready for distribution.

SETUP AT WORK

A typical Windows 95 installation begins when you load Setup. There are, of course, several ways to do that. You can simply locate the setup.exe file and double-click on it. For installations from CD-ROM, manufacturers often provide a setup screen that lets you click a button that launches setup.exe or install.exe. Or you can go into the Control Panel and use the Add/Remove Programs icon.

Two areas of your system will bear the brunt of Setup's execution: The hard disk will end the installation process holding more files and directories than it had before, and the Registry will end up larger and more complex. We'll look at these two processes in some detail.

What happens to the hard disk is easier to understand, because most of us have spent time creating and deleting directories and subdirectories and copying files into various

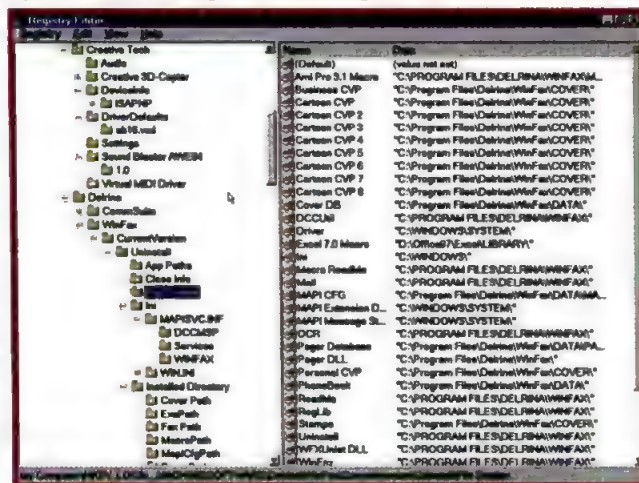


FIGURE 1: Each installed program stores information in the Registry. Here are the entries for Delrina, with WinFax's File Section highlighted; above Winfax in the left pane are the Registry keys for the Creative Labs Sound Blaster AWE64 card.

installation even begins, the program must obtain information about your machine's configuration, to make sure you have the necessary resources to install and run the software. Second, the program isn't supposed to touch CONFIG.SYS, AUTOEXEC.BAT, or the

locations. Some installations perform delete operations; when you upgrade to Microsoft Office for Windows 95, for example, Setup offers to remove earlier versions of its component programs. But most installations just add directories and files and don't get involved in deletions at all. Most new files get stored in the application directory and subdirectories you establish during the Setup process, which by default are usually `c:\Program Files\App-Name` and its subdirectories. These are easy to find with Windows Explorer.

As long as you leave the program on your computer, there's no need to concern yourself with the files added by that program's Setup. In fact, only when you want to get rid of the program do the full effects of the installation surface. In the old DOS days, erasing a program meant deleting the directory and subdirectories in which it resided, and that was that. In Windows 3.1, however, files were installed into various locations on your hard disk, and Windows 95 has continued that practice. At installation time, files of various types get placed in your `c:\windows` directory and one or more of its subdirectories. If a new application needs its own fonts, as Corel's applications do, font files are placed in (not surprisingly) the `c:\windows\fonts` directory. And virtually all Windows 95 installers end up putting .DLL files into the `c:\windows\system` directory, where they'll be available to the program whenever they're needed.

The Registry, on the other hand, is much more complicated. Unlike the .INI files they replaced, Registry files are stored with the read-only, hidden, and system attributes in place. As a result, deleting Registry files can hardly be considered an accident. Furthermore, Windows 95 automatically backs up Registry files whenever you shut down your system, so if something happens, you can go back to your last working configuration. You can edit the Registry, but most of the action in the Registry is caused initially by the installation of Windows 95 itself, then by the installation of other 32-bit programs.

The Registry consists of two main files, `user.dat` and `system.dat`. `User.dat` contains details about the Windows 95 configuration for one specific user. If you establish more than one user for your machine, each user gets a separate subdirectory and a separate `user.dat` file inside that directory. `System.dat`, as you'd expect, contains information about your system, including hardware, drivers, IRQs, and—most significant for our purposes here—application settings. The Registry is organized according to keys, with each key representing a specific configuration item. Each key has a corresponding setting, with a value that can be a binary number or a text string.

To see the Registry, and to edit it if you wish, launch the program called RegEdit, which exists in your `c:\windows` directory (click Start

Run and type *regedit* to get to it). You'll find that RegEdit displays the contents of the Registry more or less the way Explorer displays the contents of your disk drives, with the main keys and subkeys arranged hierarchically on the left and the contents of those keys shown on the right. Each new 32-bit program you install will add a set of subkeys to the main key called `HKEY_LOCAL_MACHINE\SOFTWARE`. The first subkey will usually be the software publisher's company name and the next subkey the name of the product. Well-behaved programs add yet another subkey, this one showing the software version. Another set of subkeys is added to the `HKEY_CURRENT_`

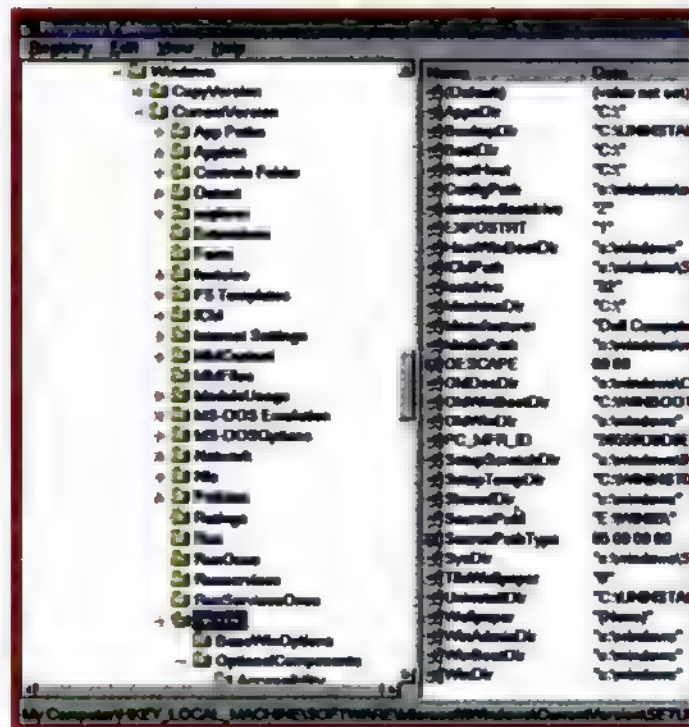


FIGURE 2: To get an idea of the extent of the Registry's entries, look in the Software section in `Microsoft\Windows`. Shown here are a few of the keys on the left and, on the right, the values for *SETUP*.

`USER\SOFTWARE\main` key, again under subkeys for company name and product name. Here you'll find user-specific information, such as preferences and serial numbers. User-specific values are established by Setup but may also get altered as you change the program's preferences and configuration during use. You can examine all these settings within RegEdit by clicking on the appropriate keys on the left and reading the values on the right. You can also modify them, but unless you have a good reason, it's best to leave any modifications to your programs.

Installation causes even more alterations to the Registry. Remember the `PATH` statement from good old `AUTOEXEC.BAT`? Windows 95, which by itself doesn't use `AUTOEXEC.BAT`, puts program paths in the registry instead. You'll find them in `HKEY_LOCAL_MACHINE`, under the subkeys `Software\Microsoft\Windows\AppPaths`. And remember the information about extensions that was stored in Windows 3.x's `win.ini` file? That's handled in the Windows 95 Registry under `HKEY_LOCAL_MACHINE\Software\Classes` and mirrored in `HKEY_CLASSES_ROOT`. Setup puts those keys in place as well.

Two additional duties for which Setup is responsible are storing information required for uninstalling applications and notifying Windows that an application will be using DLLs that are already on the system. Uninstallation values are placed under the company and product names in `HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Uninstall`. Shared DLLs are noted by Setup's advancing the usage counter for the DLL in question under `HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Shared DLLs`. The number of programs sharing a DLL can be found in the Data column of the right-hand pane in RegEdit. A typical reading will show a particular DLL file shared by `0x00000008` applications, which means that 8 installed programs make use of it. The next program you install that wants to share it must advance the counter to 9.

How does this all happen? When you install a new program, Setup's first task is to see whether you have the horsepower to run the program and the disk space to store it. For some programs, particularly games, your video and audio capabilities might also undergo scrutiny at this time. Once those tests are out of the way (and assuming you pass), you need to make some choices. First, you'll often be asked to type in your name, perhaps a company name, sometimes a serial number, and so on. Then you'll type or select where you want to store the program files, then the program group you want the application to be a part of. Finally, you specify that everything's fine, and the installation procedure begins. Directories and subdirectories are created, files are copied into these directories and wherever else they're needed (such as `c:\windows\system`), and changes are made to the keys and values in the Registry.

At a later point, if you no longer need your new program, you can use Add/Remove Programs or the application's uninstaller (look in the application's directory) to reverse the process, removing Registry keys, erasing files, and deleting directories, until all traces of the program are gone. In practice, however, a complete erasure rarely happens, and you may have to use Explorer to help you get rid of the rest. If you don't use Add/Remove Programs or the uninstaller, you'll end up with unneeded DLLs and useless Registry keys scattered throughout your system. You can track them down manually or get a deinstallation package such as Microhelp's Uninstaller to help you, but leaving them on your hard disk won't do any harm. □

Neil Randall is a frequent contributor to PC Magazine and is the author of several books about the Internet, including the recently published The Soul of the Internet and Special Edition Using Microsoft FrontPage. He can be reached at nrandall@mariner.uwaterloo.ca.

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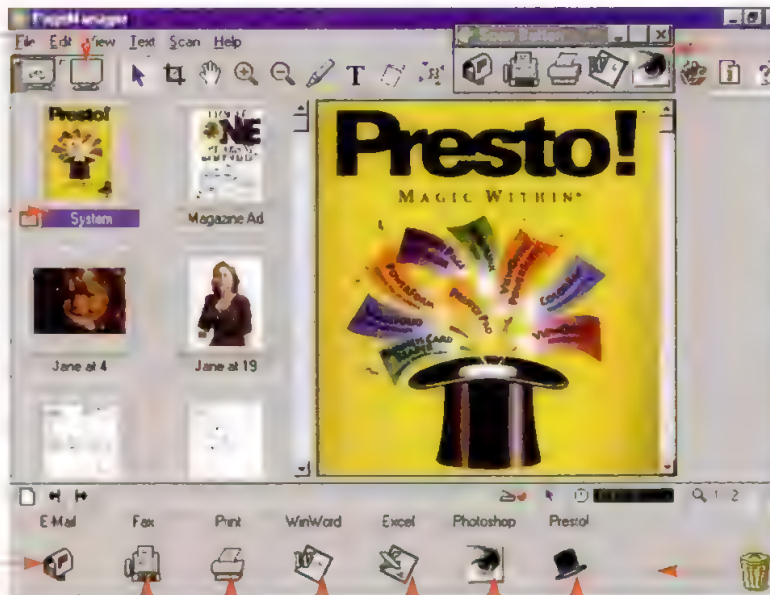
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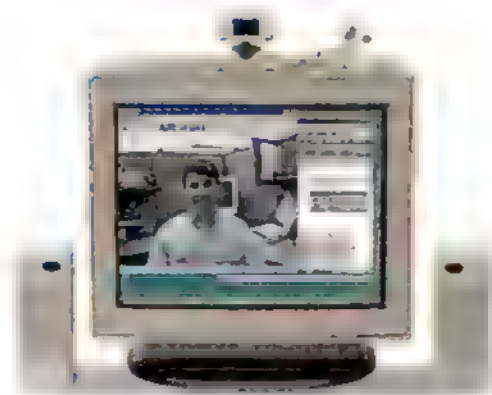
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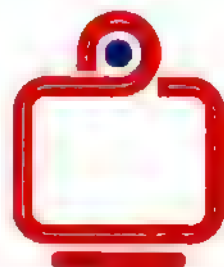
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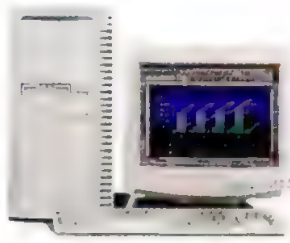
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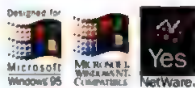
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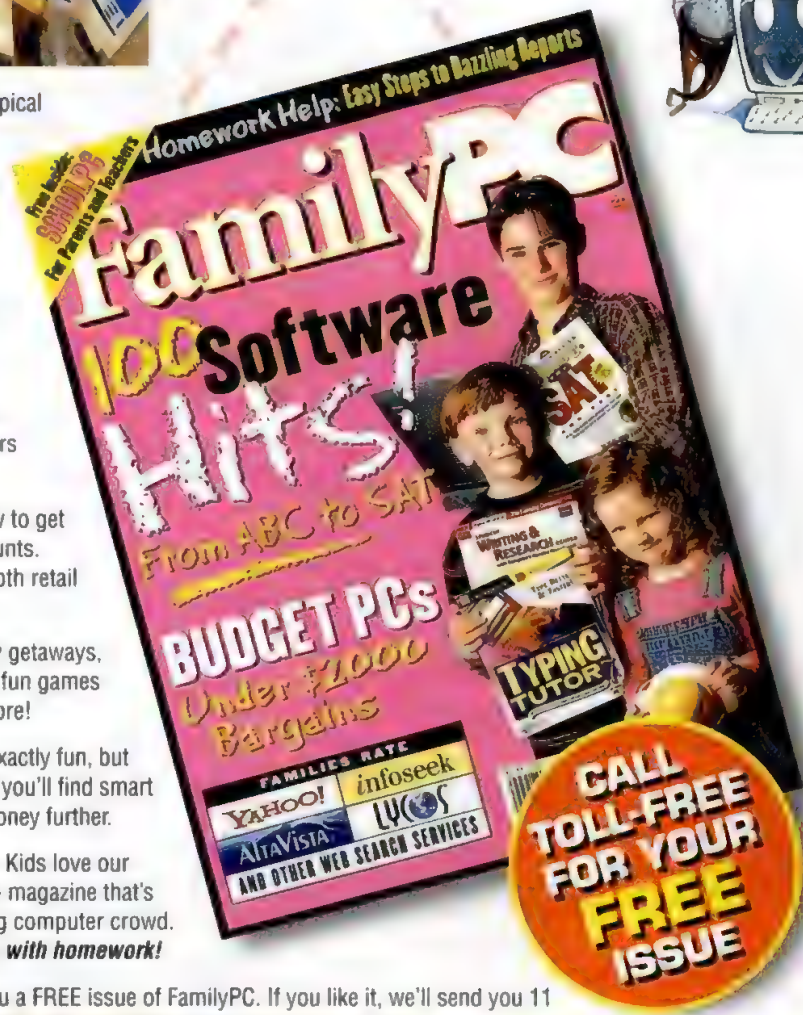
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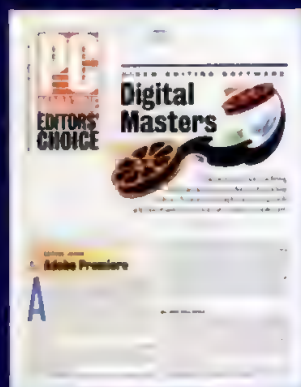
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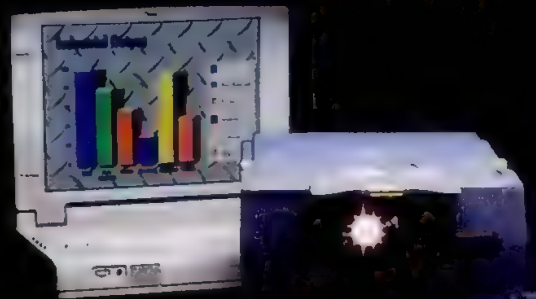
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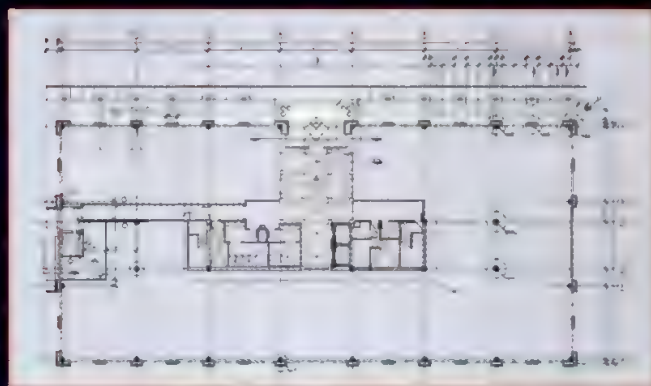
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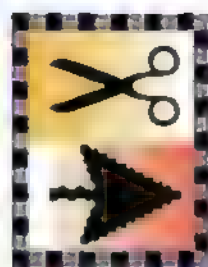
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PC Tech/Utilities

By Michael J. Mefford

FileGrab: The Missing Link

Grab file lists from Explorer for use in other applications.

The Windows 95 Explorer is a powerful file manager that provides various views of your files and a built-in search utility. But one feature it does not offer is a way to use its file lists in other applications. What if you want to send someone a list of the files in a folder or save the results of a file search in a spreadsheet? You can't do it. When you drag a file from Explorer and drop it onto another application, you get the file's contents, not its name. The only way to get Windows 95 to give you a list of filenames is to open a DOS window and run the DIR command, with the output redirected to a file.

This issue's utility, FileGrab, lets you harness the power of Explorer's listing ability for use by other applications. When you drop files from Explorer onto the FileGrab window, you get a list of filenames, instead of the files' contents. You can save the list to disk, print it, or copy it to the Clipboard for pasting into another application. View options let you choose which file characteristics (such as date, size, or attributes) to include with the filenames.

FileGrab is a 32-bit utility that runs under Windows 95 or Windows NT 3.51 or higher. You can obtain FileGrab by downloading it from PC Magazine Online or by mail. Refer to the sidebar "Getting the Files" for details. The source code for FileGrab, which was written with Delphi 2.0, Borland's visual programming tool, is also provided for those interested in seeing how it works.

USING FILEGRAB

To install FileGrab, copy the program files Filegrab.exe and Filegrab.hlp to a subdirectory on your hard disk and create a shortcut for FileGrab on your desktop or in your Start Menu programs. When you launch FileGrab, you'll see an empty window ready to accept filenames from Explorer. For a quick demon-

stration of how it works, open an Explorer window (it's okay if the windows partially overlap), highlight a group of files, drag them over to FileGrab, and drop them into its window. Voilà! There's your file list (see Figure 1).

You can copy filenames from Explorer's Find utility, as well as from Explorer itself. You don't have to worry about anything happening to the files when you drop their names onto FileGrab. They'll stay right where they are; only the filename data is copied into FileGrab.

You can also drag highlighted filenames from Explorer to the minimized FileGrab button on the taskbar. The taskbar button

plorer, and then select Edit | Copy from the Explorer menu, press Ctrl-C, or right-click on the selected files and choose Copy from the pop-up menu. After you've copied the file data to the Clipboard, switch to FileGrab and paste the filenames by selecting Edit | Paste from the FileGrab menu or pressing Ctrl-V.

Filenames appear only once in the FileGrab list, no matter how many times you add them. FileGrab considers the fully specified filename, including the path, when checking for duplicates. If you seem to see two occurrences of the same file in the list, check the Full Path item in the View menu and you'll see that they're actually different.

Explorer can be in any of its view modes (Large Icons, Small Icons, List, or Details) when you drag or copy filenames. FileGrab, however, always displays the filenames in details mode. Once you have a filename list in FileGrab, you can use the View menu to select which of the file properties you want to include in the display. Checking an item adds it to the display; unchecking the item removes it. The view options are Full Path, DOS Name, Size, Creation Date, Modified Date, Accessed Date, and Attributes. By default, only the Full Path and Modified Date properties are displayed. If you turn off Full Path, only the filename will be displayed.

Once you have set the view options to display the filename list as you want it, you can save the list to disk, print it, or copy it to the Clipboard. To enable the copy feature, you must select the files you want from the list. Click the Copy to Clipboard button or select Copy from the Edit menu to copy the selected filenames as ASCII text to the Clipboard. If you select Cut instead of Copy, the filenames are removed from the FileGrab list as they are copied to the Clipboard. The Clear button removes the selected items from the FileGrab

IN THIS ISSUE

FileGrab

FileGrab uses Explorer to give you a list of filenames. You can save the list to disk, print it, or copy it into the Clipboard for pasting into another application. Selecting View | Options lets you choose which file characteristics (such as date, size, or attributes) are included with the filenames.



itself won't accept drag-and-drop, but if you hold down the mouse button, the window will open and then you can drop the files. The advantage of this method is that you can still use FileGrab when Explorer is maximized.

Another way to copy the files without having to view both windows simultaneously is to use cut and paste. Select your filenames in Ex-

FOR PROGRAMMERS ONLY FileGrab is a 32-bit program written with Delphi 2.0, Borland's visual programming tool. The full source code is available on PC Magazine's Web site (www.pcmag.com) and demonstrates the following programming techniques:

- how to get file information from Explorer by cut and paste, as well as drag and drop;
- how to query Windows for the icons associated with a file; and
- how to change the displayed columns in a Delphi list view dynamically.

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list without copying them to the Clipboard. To clear the entire FileGrab list, choose Select All from the Edit menu or press the hotkey Ctrl-A, then click the Clear button.

When FileGrab copies selected filenames to the Clipboard, it ensures that the columns for each displayed file property will neatly line up by making all the entries in a column the same number of characters. Fields that have fewer characters than the longest entry in the column are padded with spaces. Fields are separated with tab characters, so that the columns line up even when a proportionally spaced font is used, and so that they will be formatted correctly when pasted into a spreadsheet.

When you save your list to disk, the default format is the same as when you copy to the Clipboard; FileGrab pads columns with spaces and a tab, so that they line up. You can also choose to separate the file properties with commas instead of spaces and a tab character (the CSV or comma-separated values option). This is useful if you plan to import the list into a database or spreadsheet. To save the file list to disk, click the Save As button or select File | Save As. The Save As Type drop-down filter lets you choose between .TXT and .CSV formats.

When you print a filename list, by default FileGrab uses a fixed-space font, 10-point Courier New, so the characters in the columns will line up. For a different font, select Printer Font under the File menu. You do not have to use the same font for printing and screen display. To select a different font for screen display, choose File | Screen Font. The font is not saved when you copy the list to the Clipboard. You'll have to reselect the desired font from within the application where you've pasted the list.

FileGrab supports in-place editing, like Explorer, in case you want to make any changes to filenames. To shift into edit mode, select a file, wait a moment, then click on it again. The original file won't be renamed; only the text that is sent to the Clipboard, a file, or a printer will reflect your changes. You can also sort the list by clicking on the column header buttons. A second click on the same button before you click on any other will sort the list in descending order. You can resize a column by dragging the left or right edge of the header button above it. FileGrab remembers all your custom settings.

FILEGRAB INNARDS

FileGrab demonstrates some interesting programming tricks, which I'll discuss in the second part of this article. I'll offer an efficient way to enable an application to accept both dropped and pasted file information, and I'll show you how to retrieve the icons associated with files. Once retrieved, the data has to be displayed in a varying number of columns, depending on the view options the user has selected. I'll reveal a stumbling block I encountered in accomplishing this and show you how

to get around it. Finally, I'll describe how I formatted the information for output to disk, printer, or clipboard.

There are two parts to enabling drag-and-drop in an application: You must make the application aware that files have been dropped, and you must give it the ability to handle the dropped file information. DragAcceptFiles is the Windows API function that makes it possible for a window to accept dropped files. The function's two parameters are the handle of the window registering to accept dropped files and a boolean value named fAccept, which you set to True when you want to accept dropped files.

An application that calls DragAcceptFiles with the fAccept parameter set to True has identified itself as able to process the WM_DROPFILES message from File Manager or Explorer. The WM_DROPFILES message is sent when a user drags files from File Manager or Explorer and releases the left mouse button while the cursor is in the window of an application that has registered itself as a recipient of dropped files. In FileGrab, that window is a ListView component.

Ordinarily, a message-handler method for WM_DROPFILES would be all you need for handling the dropped file information. But in the case of FileGrab, I wanted a handler that could handle pasted as well as dropped file information. To accomplish this, I created a ListView descendant called MyListView and overrode the method DefaultHandler. That lets me handle both types of information with a single method (see Figure 2). An instance of the subclassed ListView is created in File-

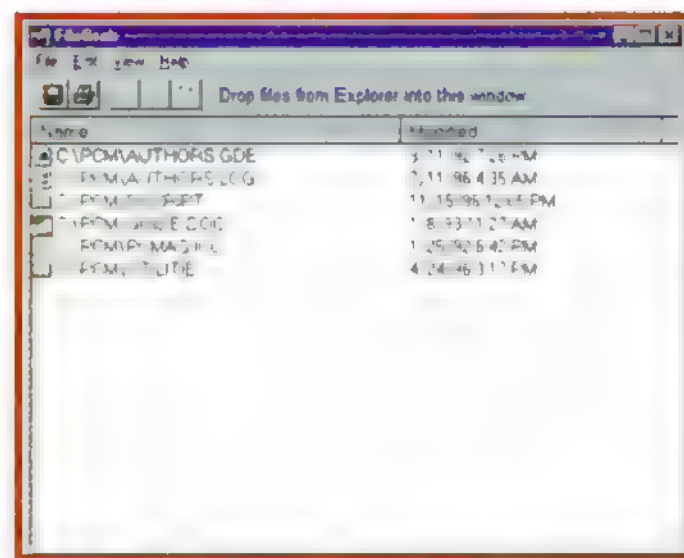


FIGURE 1: When you drop filenames from Explorer onto the FileGrab window, they appear in a list that you can print, save to disk, or copy to the Clipboard.

Grab's FormCreate procedure. In this procedure, FileGrab calls DragAcceptFiles, registering MyListView.

Also at creation time, FileGrab registers a new, unique window message with this statement:

```
InternalPasteMessage:=
RegisterWindowMessage('FileGrab
PasteMsg');
```

When Paste is selected from the Edit menu, FileGrab sends InternalPasteMessage with this statement:

```
MyListView.Perform(InternalPasteMessage,
Clipboard.GetAsHandle(CF_HDROP), 0);
```

By calling the Clipboard's GetAsHandle method with the CF_HDROP Clipboard format, I can obtain the contents of the Clipboard as a handle to data with the same format as dropped data from WM_DROPFILES. The Clipboard can contain data in other formats, depending on what a user has copied into it from other applications, so FileGrab's Paste command is only enabled when the Clipboard contains the CF_HDROP format. When a user selects the Edit menu, the format is checked with this statement:

```
Paste1.Enabled:= Clipboard
.HasFormat(CF_HDROP);
```

Since data, whether pasted or dropped, is in the CF_HDROP format, DefaultHandler can handle both messages.

The first thing MyListView.DefaultHandler does is to call the inherited DefaultHandler, so that the inherited method can process messages handled by the TListView component. MyListView then checks whether the message is either of the two it's looking for, WM_DROPFILES or InternalPasteMessage. If it is, FileGrab saves the number of items currently in the filename list, because that number will be the index of the first item added.

RETRIEVING FILENAMES

The filename data is retrieved by calling the Windows API function DragQueryFile many times, in order to process the list of dropped files. The function's first parameter is the handle of an internal Windows structure that stores the file information. The information that DragQueryFile returns is determined by the second parameter.

If the second parameter is -1, DragQueryFile returns the number of dropped files. The DefaultHandler retrieves the file count first, so that it can set up a counter for retrieving the filenames in a loop. If the second parameter is greater than or equal to 0, then the information returned by DragQueryFile is determined by the third parameter. If the third parameter is NULL, then DragQueryFile returns the number of characters in the dropped filename, which we use to set the buffer size. If the third parameter is a pointer to a buffer, then DragQueryFile returns the filename string (including the path) in the buffer. The fourth parameter tells DragQueryFile the size of the receiving buffer, so that the function won't overrun memory.

For each file, the DefaultHandler calls DragQueryFile with the buffer pointer set to Nil, so it can get the size necessary for the re-

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that I put out around the web. It was a simple, simple copy and paste. Then I saw the first image in Macromedia's 3D. To get your fingers in the hands, I used a finger in 3D, and extended it to look realistic. But I also wanted this image to be surreal, so I used the 'Saturate' to achieve the green effect. Extreme 3D gave me a hand to model the pencils and make them really pop. And with my self portrait. Thanks for the great work. Hope that's not too far to face!

the text around the face. Then I used a cool 3D rotating tool, I created it and drew it a new hand. The font I used was created in Fontographer. I picked them up from the font library. I saved time by using FreeHand's (FreeHand) Internet layout for the image.

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```

procedure TMyListView.DefaultHandler(var Message);
var
  DroppedFilesCnt : integer;
  DropIndex : integer;
  NewFilesStart, NewIndex : Integer;
  BufferStr : string;
  Buffer : PChar;
  BufferSize : integer;
  ImageIndex: integer;
  TS : TSearchRec;
  DTFormat : string;
  TSF : TSHFileInfo;
begin
  inherited DefaultHandler(Message);
  with TMessage(Message) do
    if (Msg = WM_DROPFILES) or
      (Msg = InternalPasteMessage) then
      begin
        NewFilesStart := FilenameList.Count;
        DroppedFilesCnt:= DragQueryFile(wParam, -1,
          PChar(0), 0);
        for DropIndex:= 0 to DroppedFilesCnt - 1 do
          begin
            BufferSize:= DragQueryFile(wParam, DropIndex,
              PChar(0), 0);
            GetMem(Buffer, BufferSize + 1);
            try
              DragQueryFile(wParam, DropIndex, Buffer,
                BufferSize + 1);
              with FilenameList do
                if IndexOf(Buffer) = -1 then
                  AddObject(Buffer, Pointer(0));
            finally
              FreeMem(Buffer);
            end;
          end;
        end;
        if Msg = WM_DROPFILES then DragFinish(wParam);

        for NewIndex:= NewFilesStart to FilenameList.Count-1
        do
          begin
            BufferStr:= FilenameList[NewIndex];
            FillChar(TSF, SizeOf(TSF), 0);

```

```

            if SHGetFileInfo(PChar(BufferStr), 0, TSF,
              SizeOf(TSF),
              SHGFI_ICON or SHGFI_SMALLICON) <> 0 then
              begin
                with MainForm.Image1 do
                  begin
                    Canvas.Brush.Color:= clWindow;
                    Canvas.FillRect(ClientRect);
                    DrawIconEx(Canvas.Handle, 0, 0, TSF.hIcon,
                      16, 16, 0, 0, DI_DEFAULTSIZE or DI_NORMAL);

                    ImageIndex:= MainForm.ImageList1.Add(
                      Picture.Bitmap, Picture.Bitmap);
                  end;
                FilenameList.Objects[NewIndex]:=
                  Pointer(ImageIndex);
              end;

            if FindFirst(PChar(BufferStr), faReadOnly or
              faHidden or
              faSysFile or faDirectory, TS) = 0 then
              with TS.FindData do
                begin
                  if cAlternateFileName = '' then
                    ColumnLists[1].Add(cFileName)
                  else
                    ColumnLists[1].Add(cAlternateFileName);
                    ColumnLists[2].Add(IntToStr((nFileSizeHigh *
                      MAXDWORD)
                      + nFileSizeLow));
                    DTFormat:= ShortDateFormat + ' ' +
                      ShortTimeFormat;
                    ColumnLists[3].Add(FormatDateTime(DTFormat,
                      GetDate(ftCreationTime, TS.Time)));
                    ColumnLists[4].Add(FormatDateTime(DTFormat,
                      GetDate(ftLastWriteTime, TS.Time)));
                    ColumnLists[5].Add(FormatDateTime(DTFormat,
                      GetDate(ftLastAccessTime, TS.Time)));
                    ColumnLists[6].Add(AttributeString(dwFileAttributes));
                  end;
                end;
              end;
            MainForm.ColumnsUpdate;
          end;
        end;
      end;

```



FIGURE 2: *TMyListView's DefaultHandler extracts filenames from the standard WM_DROPFILES message and from the Clipboard.*

ceiving buffer. It then allocates memory for the buffer and calls DragQueryFile again, this time with the pointer to the buffer.

Before storing the filename in the FilenameList, an instance of the TStringList object, DefaultHandler makes sure the filename is not already in the list by calling the TStringList method IndexOf with the newly retrieved filename as a parameter. If the filename is found, the method returns the index of the string in the list. If not, it returns -1, and DefaultHandler adds the new name to the FilenameList.

A TStringList object optionally associates a 4-byte value (usually an object or other pointer) with each string. FileGrab uses this feature to add an index into an ImageList component that will contain the small icon associated with

the file. At this point, FileGrab doesn't know this value, so it sets the index to 0, the first image in the ImageList. The value has to be typecast as a pointer in order for ListView to accept it. The Nil pointer will be replaced later with a pointer to the file's icon in the ImageList.

If the message that activated DefaultHandler was WM_DROPFILES, the Windows API function DragFinish is called after all the filenames have been retrieved. DragFinish releases the internal data structure that Windows allocated for use in transferring filenames to the application.

FILE PROPERTIES AND ICONS

At this point, we have all the fully specified filenames from the dropped or pasted files,

but we still need the associated icons and file properties (DOS name, file size, creation date, last write date, last access date, and file attributes). I had to retrieve these in a separate loop to avoid memory exceptions.

To give FileGrab the look of Explorer's Details view, I wanted the file listing to display the familiar small icon associated with each file. This icon can be obtained with the Windows API function SHGetFileInfo, which is specific to Windows 95 and returns information about an object in the file system. The first parameter of SHGetFileInfo is a pointer to a fully specified filename. The last parameter determines what information should be returned about that file. We want the small icon associated with the file, so we OR two flags—

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SHGFI_ICON and SHGFI_SMALLICON—together and pass the result as the parameter. (SHGFI_ICON tells SHGetFileInfo to retrieve the file's icon, and SHGFI_SMALLICON is a modifier that specifies the small icon.) SHGetFileInfo returns 0 if it's successful and places the requested information in the third parameter, TSF, which is a TSHFileInfo structure.

If SHGetFileInfo is successful, DefaultHandler uses an Image component to store the icon temporarily. First it clears the Image component by filling it with clWindow, the same color as the ListView's window. The window color will show through any part of the icon that is transparent. DefaultHandler then calls the Windows API function DrawIconEx to draw the icon on the canvas of the Image component. Now FileGrab has a copy of the icon, which is added to an ImageList component, a container for a group of graphic images. The index stored with the filename in the FilenameList is changed to the index of the new small icon in the ImageList.

The file properties are obtained with the FindFirst function. When it's passed a fully specified file name, FindFirst returns the file properties in a TSearchRec structure. I retrieve the file properties from the TSearchRec and store them in an array of TStringLists, one list for each property.

DYNAMIC LISTVIEW DISPLAY

In my first design of FileGrab, I placed all the property data directly into the ListView, instead of managing it separately in string lists. The ListView was fixed to seven columns, the number of displayable properties. Property columns not selected for display were hidden by setting their widths to 0. This was easy to do and to manage; it also worked well, except for one annoying factor: When the width of a ListView's last column is 0, the ListView displays the first character of the column followed by an ellipsis, indicating that something

is hidden. This is undesirable behavior in FileGrab; when a user chooses not to see a column, the column must be totally hidden.

To avoid this built-in behavior, I store the file information in string lists and recreate the ListView each time the user changes a view option, adding only enough columns to display the selected items. FileGrab recreates the ListView in the ColumnsUpdate procedure.

The first thing ColumnsUpdate does is to reinitialize the ListView by clearing all stored data and deallocating the memory for the columns. The first column, which holds the filenames, is added back in, its width is restored to its original value, and the button at the top of the column is given a caption. The file property columns are added in a similar manner, as necessary, according to the View menu selections.

Once the ListView has been reconstructed, the data stored in the string lists can be added. ColumnsUpdate does this by calling the ListView's Items.Add method, which returns a pointer to the next item. We store the pointer in a variable calledNewItem.

First we add the information stored in FilenameList. The name copied to the ListView is either the entire string stored in FilenameList or just the filename, depending on whether the Full Path menu choice is checked.

The ListView has an ImageIndex property, an integer, that lets you display an image with each item. The index into the ImageList is stored in the FilenameList's object pointer area, but it is typecast as a pointer. It has to be cast back to an integer before ImageIndex will accept it.

The property columns are filled with the stored data in the ColumnList array. Which TStringLists in the array are used is determined by the View menu options. Finally, ColumnsUpdate calls FileGrab's UpdateButtons procedure to enable or disable buttons and menu items, depending on whether they are currently relevant.

FILE LIST OUTPUT

The last thing I want to mention is how the retrieved data is formatted for output to the Clipboard, the printer, or a file. FileGrab's CopyList procedure does the work by first calculating the amount of memory needed to hold the information in a buffer and then allocating it. The size of one output line is calculated by summing the lengths of the longest items in each displayed column, adding the spaces between columns plus 2 for the carriage return and line feed at the end of the line. The size of the buffer is the size of one output line times the number of items.

After the buffer has been allocated, the data in each column is moved into it and padded with spaces, so that the lengths of all the strings in a column are the same. The fields are delimited with tabs or commas. Each line in the buffer is terminated with a carriage return and a linefeed, and the whole buffer record is terminated with a NULL character.

The buffer is then copied to the appropriate device. This sends the buffer to the Clipboard:

```
Clipboard.SetTextBuf(Buffer)
```

To write to a printer or file, the device has to be assigned and then opened with Rewrite. The data can be written with this statement:

```
Write(Text, Buffer);
```

Then simply close the device.

IN CLOSING

Explorer is a modern file manager with features galore, but it lacks the ability to create file lists in text format. FileGrab corrects this omission by acting as the missing link between Explorer and other applications. □

Michael J. Mefford is a contributing editor of PC Magazine.

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Here's how you can access PC Magazine Online, where you'll find all our utilities and other PC Tech files:

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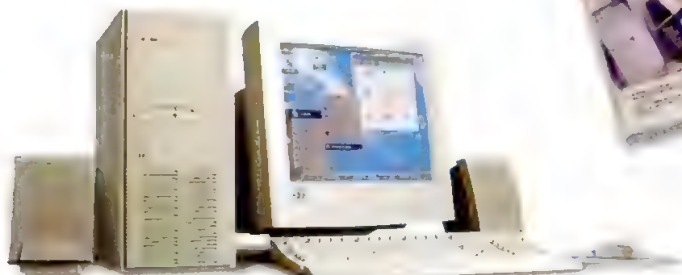
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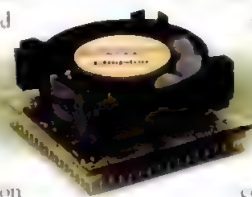


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PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

User-to-User

By Neil J. Rubenking

Look, Ma—No Hands!

Well, "no mouse" is more accurate. Did you know you can play FreeCell in Windows 95 using only the keyboard? You use the numbers 1 through 8 to take a card from the columns of cards. 0 selects the free cells, and 9

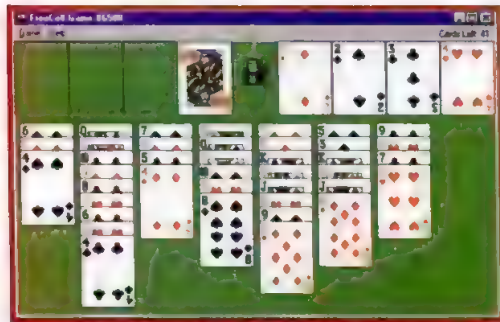


FIGURE 1: Few people realize that the FreeCell solitaire game can be played using only the keyboard.

sends a card to a target cell. Press any digit twice to get a full look at all cards in the column.

TALOR SAX
via the Internet

PC MAGAZINE: The FreeCell solitaire game was the poster child for Win32s, the subset of the 32-bit Windows API designed to be installed in Windows 3.1 (see Figure 1). By default, when you installed Win32s, FreeCell was installed as a sample 32-bit application. FreeCell is also an optional accessory in Windows 95 and Windows NT 4.0, though oddly enough, the version supplied with Windows 95 is a 16-bit program. And all of these versions secretly work with the keyboard, as described here. More specifically,

you can make these moves:

- To move cards from one column to another in the layout, press the number of the starting column and then the number of the destination column.
- To move the exposed card in a column to the home cells, press the column number, followed by 9.
- To move the exposed card in a column to one of the four free cells, press the column number followed by 0.
- To move a card from one of the free cells back to a column in the layout, press 0 repeatedly until the card is highlighted, then press the number of the destination column; to move the card to the home cells, press 9.

FreeCell is a variation on solitaire, but every one of its 65,536 different starting layouts can be won—at least in theory. Bored with playing solitaire while listening to music on hold? You might give FreeCell a try. It's not exactly a productivity-enhancement tool, but it may improve your mental state!

Find Out How Much Space Files Really Occupy

Your column of September 26, 1995, described a batch file you could use to find the sizes of files stored in and below a specified subdirectory. Since I was also concerned about the space wasted on a disk because of VFAT allocations, I modified the batch file to show the amount of space a

@ECHO OFF

rem FILES.BAT returns size of files and space allocated

ECHO The number and size of files in and below this folder %1 is:

DIR %1 /-B/S/V/A | FIND "bytes" > %TEMP%\FILES.TMP

FIND "file(s)" %TEMP%\FILES.TMP | SORT /R | FIND "bytes" /N | FIND "[2]"

ECHO.

ECHO The amount of space allocated is:

FIND "dir(s)" %TEMP%\FILES.TMP | SORT /R | FIND "bytes" /N | FIND "[2]"

DEL %TEMP%\FILES.TMP

FIGURE 2: Under Windows 95 or DOS 6.2 or later, this batch file reports the actual disk space occupied by files in and below a given directory.

HIGHLIGHTS



HARDWARE Find out why having the fastest motherboard clock speed may not necessarily be the best for your needs. *Page 292.*



OPERATING ENVIRONMENTS If you've upgraded from Windows 3.x to Windows 95, you should make sure your permanent swap file isn't larger than it needs to be. *Page 300.*



DATABASES We show you how to export your database data exactly as it is shown in Table View to an Excel spreadsheet. *Page 310.*

OUR ADVISORS

Douglas Boling is a contributing editor and the author of many PC Magazine utilities.

Frank J. Dorfler, Jr., is senior networking editor and the author of the PC Magazine Guide to Connectivity.

Alfred Poor is a contributing editor and the author of *The Underground Guide to Hardware*.

Brian Proffitt is a contributing editor of *Computing Today* and the author of *OS/2 Warp Survival Kit*.

Jeff Prosser is a contributing editor and the author of *DOS 6 Techniques & Utilities*.

Sal Ricciardi is a contributing editor and the author of the *Running FoxPro* series from Microsoft Press.

Neil J. Rubenking is technical editor and the author of *Delphi Programming Problem Solver*.

Luisa Simone is a contributing editor and the author of *Microsoft Publisher by Design*.

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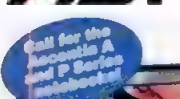
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- ▼ 16-bit stereo sound with integrated speakers
- ▼ MPEG and Motion Video Acceleration support
- ▼ 3-year worldwide limited warranty

Model	CPU	RAM	Hard drive	Color display	Price	CDW
4110	100MHz Pentium	8MB	810MB	11.3" dual-scan	\$2199.00	71112
4110D	100MHz Pentium	8MB	810MB	11.3" dual-scan	\$2499.00	71113
4120	120MHz Pentium	16MB	1.08GB	11.3" dual-scan	\$2599.00	71114
4120T	120MHz Pentium	16MB	1.08GB	11.8" active-matrix	\$3699.00	71115
4130T	133MHz Pentium	16MB	1.08GB	11.8" active-matrix	\$3999.00	71116
4131T	133MHz Pentium	16MB	1.4GB	12.1" active-matrix	\$4299.00	80775

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- ◆ 11.3" active-matrix SVGA color display
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- Media bay holding one of the following: modular 8X CD-ROM or modular floppy disk drive; advanced PCI Card slot; second battery slot
- ✓ Software: Microsoft® Windows® 95 with Microsoft® Plus! or Windows for Workgroups V3.11
- ✓ 1-year limited warranty



Model	CPU	RAM	Hard drive	CD-ROM	Display	Price	CDW
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900T	133MHz	16MB	1.35GB	optional	11.3" active-matrix	\$3689.73	79046
900CPT	133MHz	16MB	1.35GB	8X	11.3" active-matrix	\$4138.08	79047

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760ED	133MHz	16MB	1.2GB	4X	\$6349.59	67900
760ED	133MHz	16MB	2.1GB	8X	\$6899.60	74862
760E	150MHz	16MB	2.1GB	Optional	\$7666.86	74863

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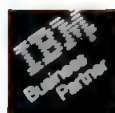
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HEWLETT® PACKARD HP Vectra 525CD PC

Includes a complete suite of Microsoft software!

- ✓ 133MHz Intel Pentium® processor
- ✓ 256KB Level 2 cache
- ✓ 16MB RAM standard, expandable to 192MB
- ✓ 1.2GB hard drive
- ✓ 8X CD-ROM drive
- ✓ Windows 95 keyboard
- ✓ 2-button mouse
- ✓ 3-year parts and labor warranty
- ✓ Software includes: Microsoft Office Professional; Publisher; Plus! Companion and more!

ViewSonic® 17GS 17" monitor

Advanced features at an affordable price

- ✓ 17" flat square CRT (16" viewable image size)
- ✓ .27mm dot pitch
- ✓ Super Contrast screen
- ✓ Up to 86Hz refresh rate at 1024 x 768
- ✓ Maximum resolution: 1280 x 1024
- ✓ Plug and Play (PnP) compliant (requires a DDC-compatible video card)
- ✓ Warranty: 3-years limited on CRT, parts and labor



Kodak DC50 and
Simple Technology 8MB ATA
Flash Memory PC Card

DC50 Digital Camera

- ✓ 24-bit color
- ✓ 756 x 504 pixel resolution
- ✓ Fully-automatic operation
- ✓ 1MB internal memory stores up to 24 images
- ✓ Uses optional ATA flash memory PC Cards, Type I and II
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- ✓ Includes PhotoEnhancer software from PictureWorks Technology
- ✓ Windows and Macintosh compatible
- ✓ Software, cables and batteries included



8MB ATA Flash Memory PC Card

- ✓ Similar in principle to a floppy disk, but has an on-board ATA controller which eliminates the need for FFS software and ensures compatibility
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III 33.6 10BT
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- ✓ 3-year U.S. and international limited warranty

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*Requires optional cable

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KENSINGTON

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- ▲ PC fax application included in HP PictureScan
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Hewlett-Packard ScanJet 5pse
and Caere OmniPage
Pro V7.0 Upgrade



OmniPage Pro V7.0 for Windows 95 Upgrade

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- ◆ HP C4565A



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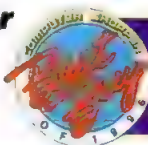
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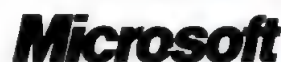
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◆ Send faxes directly from your PC ◆ Works in background to free up your PC for other tasks

* Requires Windows V3.1, V3.11 or Windows 95



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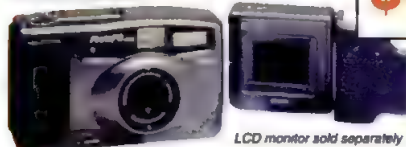


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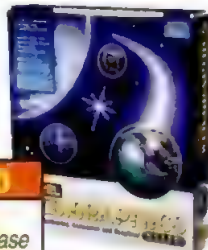
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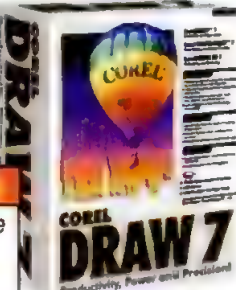
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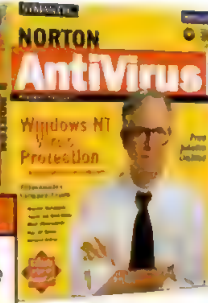
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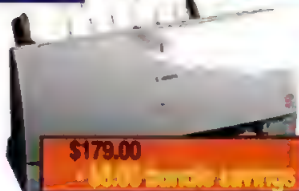


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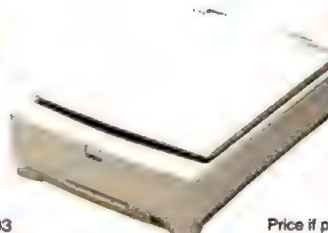
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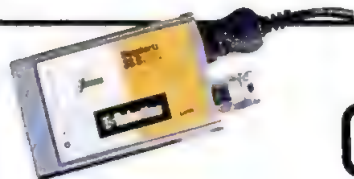
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◆ Includes fax and data software for Windows

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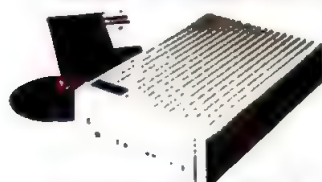
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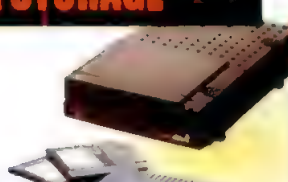
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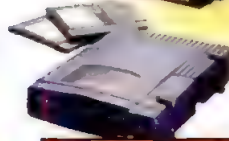
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- Runs multiple jobs simultaneously with multi-drive concurrent backup capabilities
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10/100BT 5-pack	606.42
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OfficeConnect 8-port hub, BNC port	147.19
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file actually occupies as well.

The batch file in Figure 2 uses the DOS 6.2 switch `DIR /A` to ensure that hidden and system files will be included, and `DIR /V` to show the disk space allocated for each file. The `/A` switch doesn't work, however, for files in a hidden or system directory. The batch file works on floppy or hard disks but not on CD-ROMs.

As a Windows 95 user, I found it useful to attach this batch program to the context menu for folders and drives. I did this by modifying the Registry. Below the key `HKEY_CLASSES_ROOT\Folder\shell`, I added a new key called `Space Occupied`. Then I set `HKEY_CLASSES_ROOT\Folder\shell\Space Occupied` command to "`c:\bat\files.bat %1`." The space occupied by a folder and its subfolders can now be found by right-clicking on the folder and using the context menu.

KEIRON WHITE
Moshi, Tanzania

PC MAGAZINE: It may take *PC Magazine* a while to reach Tanzania, but this tip is completely up-to-date. Summing up the sizes of files in and below a given directory tells only part of the story. The FAT (File Allocation Table) file system used by DOS and the VFAT file system used by Windows 95 both allocate space for files in units called *clusters*. The size of a cluster depends on the size of the disk and can be quite substantial. For example, the cluster size on an unpartitioned 1.2GB hard disk is 32K. Each file will have some wasted space in the last cluster, and the average wasted space per file is half a cluster, or 16K on a 1.2GB disk. `FILES.BAT` uses features of the modern `DIR` command to report both the sizes of the files and the actual disk space each occupies.

Why doesn't it work on CD-ROMs? Because CD-ROMs don't use a File Allocation Table. `DIR /V` on a CD-ROM displays nothing in the Allocated or Accessed columns, and the summary does not report the total allocated space. When applied to a CD-ROM, `FILES.BAT` will still report the number and sizes of files. Note, too, that the `DIR` command under Windows NT doesn't support the `/V` switch, even on FAT-based disks, so `FILES.BAT` won't work at all under Windows NT.

For those who tremble at the thought of editing the all-important Registry directly, there is a safer way to install `FILES.BAT` as a command on the right-click menu for folders. Launch Explorer, select Options from the View menu, and click the File Types tab. Select File Folder from the list of registered file types, and click the Edit button. In the resulting Edit File Type dialog, click the New button. In the New Action dialog, enter "Space Occupied" for the action and "`c:\bat\files.bat %1`" for the application. Click OK, Close, and Close. The new action will now appear on the right-click menu for all file folders.

Creating a Simple Web Page

Here's a quick and easy way to create a no-frills Web page for free. First, type a new message using Microsoft Internet Explorer 3.0's Mail system. Select HTML from the Format menu and use the formatting features to design your page. Next, click on the Send icon, but don't actually send the message. Instead, click on the message in your out-box and go to File | Properties. Choose the Details tab and click on Message Source. This will bring up the raw HTML source of the message.

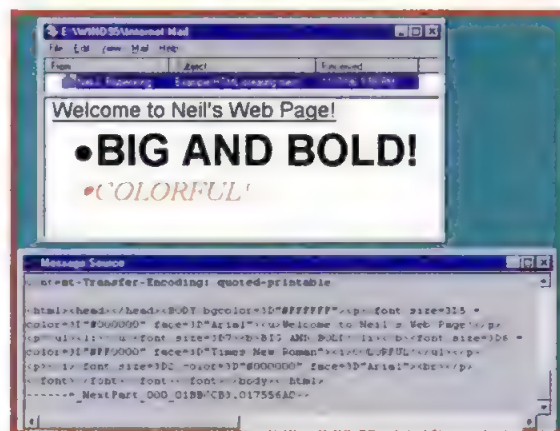


FIGURE 3: By copying part of the message source for an Internet Mail message formatted in HTML, you can create a standalone HTML document.



FIGURE 4: Loading the copied HTML file into Microsoft Internet Explorer yields disappointing results.



FIGURE 5: When the HTML source is edited to remove each instance of "3D" after an equal sign, the resulting document more closely matches the original.

Scroll down to the line right after "Content-Transfer-Encoding: quoted-printable" and you should see a line that begins like this:

```
<html><head></head>
<BODY bgcolor=3D"#FFFFFF"><p>
```

Highlight this line and everything down to but not including the line

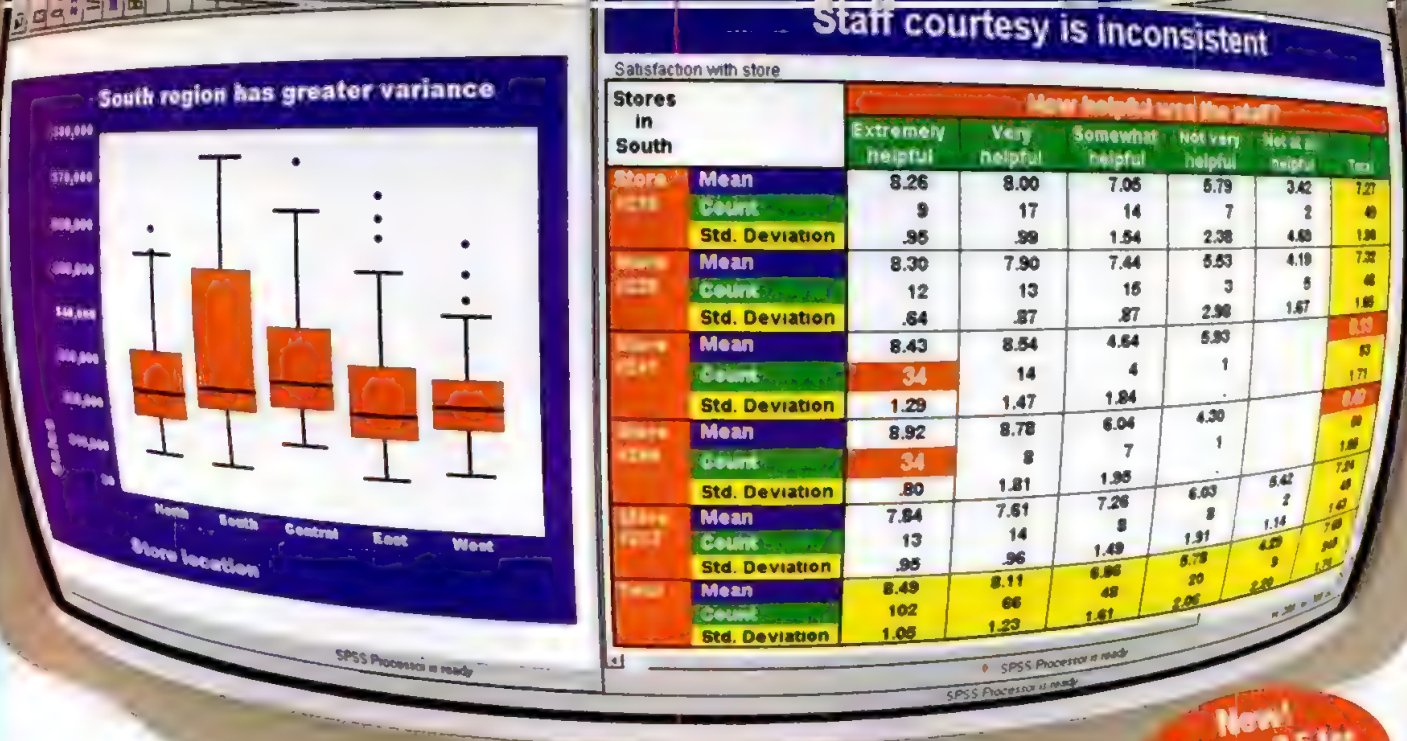
```
=_NextPart_000_01BBA597.BB47A4E0
```

Right-click and choose Copy, then open any text editor and choose Paste. This is your HTML source. Save this file as filename.htm and then open it in your browser. This is an easy way to create an HTML page without getting your hands really dirty.

MARK HURSH
via the Internet

PC MAGAZINE: You may discover, as I did, that the Properties dialog for a message in the out-box doesn't include a Details page. You can still use this technique, though—just mail the message to yourself, and right-click the received message in your inbox. Figure 3 shows a message formatted as if for a Web page, along with the corresponding message source code. But, as Figure 4 shows, if you simply save the source to an .htm file and load it into Internet Explorer, the formatting may not match your message. Here's a tip for improving the look of your instant Web page: Before saving the message source, search for instances of the string `=3D` and replace them with `=`. Figure 5 shows the same file loaded into Internet Explorer after this simple change. It looks much more like the original.

The important point is that with this technique you can create a syntactically correct HTML file without having to learn the HTML language or acquire an HTML editor. And if you get interested, you can experiment with a copy of the file. If the font sizes don't seem quite right, just tweak the numbers after font size=. See what happens if you put `<center>` before a block of text and `</center>` afterward. Who knows—you may end up learning HTML after all!



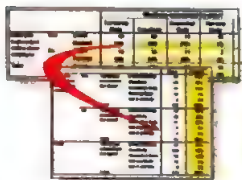
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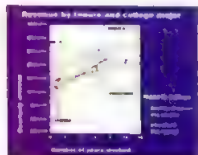
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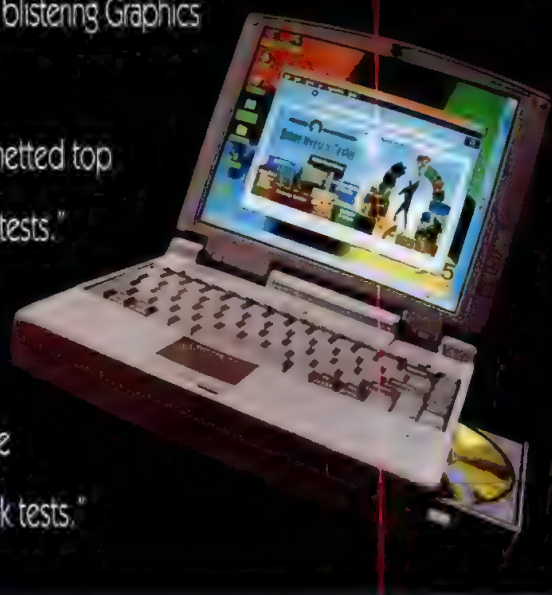
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Partition Puzzle



I have added a new hard disk to my computer, and the process has rearranged my disk drive letter assignments. My master disk is an 850MB drive with seven partitions (to minimize cluster size). I added a new 1.3GB drive as slave; it has a 255MB primary partition and a 1GB extended partition. I have divided into four 255MB partitions.

The problem is that the new slave drive's primary partition has become the D: drive, causing the rest of the master's drives to be offset by one letter (the old D: drive is now the E: drive). This means I have to reconfigure all the programs on drives D: through I: on the master disk, a procedure I would like to avoid.

This has left me with a number of questions. Would the drive letter problem be avoided if I set up the slave drive with an extended partition only? If so, what advantage is there to a primary partition on the slave drive? If the old drive fails, would I need a primary partition on the slave to make it bootable? Could I boot from a floppy disk and then use FDISK to cre-

ate a new primary partition without losing any data? What is the best strategy for long-term safety and convenience?

G. SRINIVASAN
Silver Spring, Maryland

PC MAGAZINE: The "ping-pong" effect of drive letter assignments is a result of how DOS works with IDE drives. All primary partitions are assigned first, then the virtual drives created on extended partitions. So the first answer is that you could indeed avoid the reconfiguration problem by creating only an extended partition on your slave drive.

The problem with this is that you would not be able to boot from the drive; you need a primary partition for booting. Furthermore, FDISK cannot create a primary partition on a drive where there is only an extended partition without destroying data.

The chances of your master drive failing are fairly slim, however, so you may want to favor current convenience over having a bootable second drive. If you should happen to have a problem in the future, you can always boot from a floppy disk, and then access the slave drive. If you maintain a backup of

the C: drive data on one of the slave partitions, you would be able to get a replacement master drive, restore the essential boot data, and be back in business quickly.—Alfred Poor

Speed Trials

I recently added a processor upgrade to my 486SX-33 system, which supports either a clock-tripled 40-MHz mode or a clock-quadrupled 33-MHz mode. My motherboard can be set for either 40 MHz or 33 MHz, so I can choose between the two modes. In experiments with both settings, I've found that the ZD WinBench CPU scores are two points faster at the 40-MHz setting. Should I choose based on this result, or is there a better way to determine the optimal setting?

ANDY DANIEL
Blackstone, Virginia

PC MAGAZINE: You may or may not be able to notice the difference in a two-point WinBench CPU result; it depends largely on what you do with your computer. But there may be a good hardware reason to pick the slower motherboard clock speed.

Your system has a 486 processor, so it is likely that your local bus expansion slots use the VESA Local Bus standard design (VL-

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2-4GB	Hewlett Packard	C1536AI	\$699
4-8GB	Sony	SDT5000AI	\$809
4-8GB	Seagate	C4326NP (DDS2)	\$859
4-8GB	Sony	SDT7000AI	\$909
12-24GB	Sony	DDS3 SDT9000AI	\$1399
12-24GB	HP	DDS3 C1554AI	\$1599
24-48GB	HP	External 6 tape loader C1553AX	\$2299
32-64GB	Sony	TSL7000 8 tape autoloader	\$2199
48-96GB	Seagate	C4586NP 12 tape autoloader	\$2399

SCSI 8mm DAT

3.5-7GB	Exabyte	EXB8205XL	\$1269
7-14GB	Exabyte	EXB8505XL	\$1889
7-14GB	Exabyte	EXB8700LT	\$1029
20-40GB	Exabyte	EXB8900	\$4799
70-140GB	Exabyte	EXB10H 10 tape autoloader	\$5439

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NovaStor's NovaBack CD contains software for DOS, Win 3.1, Win 95, OS/2, Warp, and Macintosh	\$79
NovaStor's NovaDisk CD contains software to backup to disk drives and removables	\$79
Seagate Arcada for Windows NT (call for network version) workstation/single server/enterprise	\$239/\$99/\$869
TAPEDISK, allows DAT drive to be used as hard drive under DOS/Win 3.1, Win 95	\$189

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IDE	Speed	RPM	Brand	Model	Wty	Price
631MB	14ms	3600	Seagate	ST3630A	3	\$145
1200MB	10ms	5400	Fujitsu	M1636T	3	\$189
1200MB	14ms	4103	JTS	JTS1200	3	\$179
1275MB	12ms	4500	Seagate	ST31276A	3	\$195
1280MB	11ms	4500	Quantum	TM31280A	3	\$195
1281MB	11ms	5200	Western Digital	WDAC21200	3	\$199
1624MB	10ms	5200	Western Digital	WDAC21600	3	\$219
1670MB	11ms	4480	Maxtor	M81750A	3	\$215
1700MB	10ms	5400	Fujitsu	M1623T	3	\$209
1700MB	12ms	4500	Seagate	ST31720A	3	\$215
2000MB	14ms	4103	JTS	JTS2000	3	\$219
2004MB	11ms	4480	Maxtor	M72004A	3	\$255
2100MB	11ms	5200	Western Digital	WDAC22100	3	\$239
2100MB	9ms	5400	Fujitsu	M1624T	3	\$235
2132MB	12.5ms	4500	Seagate	ST32132A	3	\$247
2168MB	10.5ms	4500	Quantum	TM32160A	3	\$249
2500MB	9ms	5400	Fujitsu	M1638T	3	\$249
2550MB	15ms	3600	Quantum	BF2500A	3	\$229
2550MB	10.5ms	4500	Quantum	TM32550A	3	\$262
2559MB	11ms	5200	Western Digital	WDAC32500	3	\$275
2560MB	11ms	5400	Seagate	ST52520A	3	\$275
2700MB	12ms	4480	Maxtor	M72700A	3	\$269
3166MB	12ms	5200	Western Digital	WDAC33100	3	\$299
3254MB	10.5ms	4500	Quantum	TM33200A	3	\$292
3500MB	12ms	4480	Maxtor	M83500A	3	\$365
3840MB	10.5ms	4500	Quantum	TM33840A	3	\$333
4000MB	12ms	5200	Western Digital	WDAC34000	3	\$389

• SCSI HARD DRIVES •

SCSI	Speed	RPM	Brand	Model	Wty	Int	Ext
1050MB	9ms	5400	Seagate	ST31055N	3	\$339	\$409
1280MB	12ms	4500	Quantum	TM31280S	3	\$279	\$349
2110MB	10.5ms	4500	Quantum	TM32110S	3	\$329	\$399
2147MB	9ms	5400	Micropolis	MC4421	5	\$369	\$439
2150MB	9ms	5400	Seagate	ST32155N	5	\$475	\$545
2150MB	8ms	7200	Seagate	ST32171N	5	\$699	\$769
3254MB	10.5ms	4500	Quantum	TM33200S	3	\$379	\$449
4350MB	8ms	7200	Seagate	ST34371N	5	\$1089	\$1159
4400MB	8ms	7200	Fujitsu	M2954S	5	\$819	\$889
4550MB	8ms	7200	Quantum	XP34550S	5	\$939	\$1009
4550MB	7.9ms	7200	Micropolis	MC4345	5	\$959	\$1029
4550MB	7.5ms	10,000	Seagate	ST34501N	5	\$1669	\$1739
4550MB	7.9ms	7200	Micropolis	MC4345AV	5	\$1129	\$1199
9091MB	8.5ms	7200	Micropolis	MC3391	5	\$1689	\$1759
9091MB	8.5ms	7200	Micropolis	MC3391AV	5	\$1899	\$1969
9100MB	9ms	7200	Seagate	ST19171N	5	\$2099	\$2169
9100MB	8ms	7200	Quantum	XP39100S	5	\$1539	\$1619
9100MB	10ms	7200	Fujitsu	M2949S	5	\$1549	\$1629
9100MB	8ms	10,000	Seagate	ST19101N	5	\$3569	\$3639
23.3GB	13ms	5400	Seagate	ST4234501N	5	\$4029	\$4079

WIDE SCSI

1050MB	9ms	5400	Seagate	ST31055W	5	\$389	\$529
2150MB	9ms	5400	Seagate	ST32155W	5	\$519	\$659
2150MB	8ms	7200	Seagate	ST32171W	5	\$779	\$919
4294MB	8ms	7200	Micropolis	MC3243W	5	\$899	\$1039
4294MB	8ms	7200	Micropolis	MC3243WAV	5	\$999	\$1139
4350MB	8ms	7200	Seagate	ST34371W	5	\$1189	\$1329
4400MB	8ms	7200	Fujitsu	M2954W	5	\$869	\$1009
4550MB	7.9ms	7200	Micropolis	MC4345W	5	\$999	\$1139
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4550MB	7.5ms	10,000	Seagate	ST34501W	5	\$1699	\$1839
4550MB	8ms	7200	Quantum	XP34550W	5	\$979	\$1119
9091MB	8.5ms	7200	Micropolis	MC3391W	5	\$1739	\$1879
9091MB	8.5ms	7200	Micropolis	MC3391WAV	5	\$1939	\$2079
9100MB	8ms	7200	Quantum	XP39100W	5	\$1599	\$1739
9100MB	8ms	7200	Fujitsu	M2949W	5	\$1579	\$1719
9100MB	8ms	7200	Seagate	ST19171W	5	\$2149	\$2289
9100MB	8ms	10,000	Seagate	ST19101W	5	\$3599	\$3739
23.3GB	13ms	5400	Seagate	ST423451W	5	\$4079	\$4219



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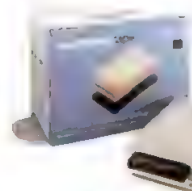


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430CDS	120MHz	16MB	1.3GB	10X	11.3 Dual	91	2,432.
430COT	120MHz	16MB	1.3GB	10X	11.3' Active	124	3,908.
510CDS	133MHz	16MB	1.3GB	10X	12.1 Dual	135	3,599.
510COT	133MHz	16MB	2.1GB	10X	12.1 Active	183	3,479.
660COT	150MHz	16MB	1.4GB	10X	11.3 Active	178	5,162.
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Size	GHz	GB	Drive	ROM			
365X	120MHz	8MB	1GB	—	10.4" Active	84	\$2 233
365X	133MHz	8MB	1GB	—	11.3 Dual	84	2 233
760EL	133MHz	16MB	2 1GB	—	12.1 Active	181	4 857
760E	150MHz	16MB	2 1GB	—	12.1 Active	190	5 535
760ED	133MHz	16MB	2 1GB	6X	12.1 Active	\$200	5 826

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Model	CPU	Ram Min,Max	Hard Drive	CD ROM	Display	LEASE	Price
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A42	120MHz	16MB	1GB	6X	12.1" Active	105	2 799
P40	120MHz	16-40MB	1.0GB	6x	11.3" Active	114	3 065
P50	133MHz	8-40MB	800MB	4X	11.3" Active	119	3 199
P50	133MHz	8-40MB	1.2GB	4X	11.3" Active	129	3 459
P50	133MHz	24-40MB	1.0MB	6X	12.1" Active	137	3 679
P50	133MHz	24-40MB	2.1GB	6X	12.1" Active	151	4 059

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E100D	100MHz	8/40MB	1GB	-	11.3" Dual	\$67	\$1,799
E133D	133MHz	16/40MB	1GB	-	11.3" Dual	75	1,999
E133T	133MHz	16/40MB	1GB	-	11.3" Active	97	2,599
M100D	100MHz	8/48MB	810MB	4X	11.3" Dual	75	1,999
M120T	120MHz	16/48MB	1GB	4X	11.8" Active	112	2,999
M133T	133MHz	16/48MB	1GB	6X	11.8" Active	131	3,499
MX133T	133MHz	16/80MB	1.35GB	8X	12.1" Active	160	4,299
MX150T	150MHz	16/60MB	2GB	8X	12.1" Active	179	4,799
MX166T	166MHz	16/80MB	2.1MB	8X	12.1" Active	179	5,199

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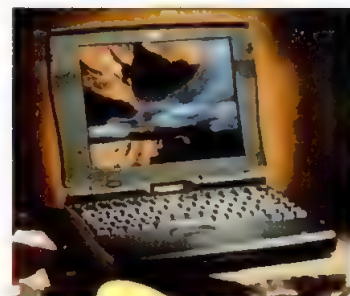
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Bus). This specification is limited to 33 MHz for unbuffered expansion slots (which is the way most VL-Bus motherboards are designed). Many users have had success in pushing VL-Bus cards to 40 MHz, but this is beyond the specification limits, and other users have encountered problems with some cards when trying to run at this speed. If you want to take a more conservative approach, you should stick with the 33-MHz system clock speed as a maximum—especially if the CPU benchmark test score doesn't show a huge difference.

The only other way to decide which way to go is to consider the system's performance using the applications you use on a regular basis. Different applications place different requirements on your system's various components, including disk storage, memory, CPU, and display. For example, a word processing program usually places little strain on any components, but graphics can be the determining factor. A database program may put more of a load on the disk-storage components. You may want to run the ZD Winstone benchmark program, which uses many of the most popular Windows applications to provide comparative performance figures. This may give you a better indication of the differences you can expect to see from the two speed settings.—*Alfred Poor*

Order in the Court

Does the order in which you turn on or off the various components of your computer system make a difference?

JAY ARNER
Lansford, Pennsylvania

PC MAGAZINE: This question is not as easy to answer as it might once have been. Before components became more intelligent, the power sequence didn't matter much. Still, the solution is relatively simple.

The issue is that some devices need to communicate with your computer at the time it starts up. For example, some SCSI devices need to "check in" at power-on in order to be recognized. Some devices, such as scanners, need to be online in order for their drivers to load properly. And some of the newer printers require bidirectional communication with the computer in order to initialize properly. If you have to turn on items in sequence, it's a good idea to turn on any SCSI devices, scanners, and printers first.

As a practical matter, the power-on self-test of most computers takes long enough for other devices to have time to get squared away before the computer is ready to come looking for them, even if you turn on all the pieces simultaneously. As a result, a good power strip is a handy way to turn everything on and off at the same time.

The same power strip will work fine for

powering-down all the parts as well. The only factor to watch out for is the shut-down procedure some devices go through when turned off; some ink jet printers, for example, need to park their printheads first. In these cases, you may need to turn off the device before you hit the switch on the power strip. Otherwise, simply wait for all activity to stop before you turn off the power at the strip. And, of course, before powering-down the system itself, you should activate the operating system's shut-down routine (if one exists). If you're using Windows 3.x, you should exit Windows first; if you're using DOS, shut down the active application.—*Alfred Poor*

Identity Crisis

My company recently instituted a policy that calls for all backup floppy disks to be labeled using a new system before being stored in a vault. The problem is that it is nearly impossible to remove the old labels. If we can't find a way to cleanly remove them, we'll have to make copies of thousands of disks and send the old ones to a landfill. Do you have any ideas on how to remove the old labels?

BOB WILLARD
Seattle, Washington

PC MAGAZINE: A number of techniques exist that might help you remove the old floppy disk labels, but the first question is, why remove them at all?

The added thickness of a second label will have no effect on the performance of a floppy disk. Plus, while the old label may still be visible, the new indexing information should be legible. Since the floppy disks will be residing in a vault, appearance probably isn't as important as it would be if the disks were being sent out to customers. And no matter which method you use, removing the labels will be a labor-intensive task that adds no value to the data stored on the disks.

The problem with getting rid of the old labels is that different papers and different adhesives are used to make labels. Your first approach should be to try to peel them off. Start with one corner, and pull slowly. If this doesn't work, you can try heating the label with a hair dryer until it is warm (but not hot). So long as you don't get the case hot enough to warp, there should be little threat to the data on the disk. Warming the adhesive will make it easier to peel the labels.

If the labels still won't come off, or if there is some adhesive residue left behind, you can use a light oil, such as WD-40 or salad oil, as a solvent. Acetone-based solvents (such as some nail-polish removers) are also effective on label adhesive but are likely to attack the disks' plastic casing, so be careful to test using a sample disk before making acetone part of your removal process.—*Alfred Poor*

OPERATING ENVIRONMENTS

Updating the Windows 95 Swap File



I recently installed Windows 95 on my computer and got rid of my old versions of DOS and Windows, but I seem to be stuck with a huge (25MB) leftover system file named 386SPART.PAR. I've noticed that this file does not appear on new computers running Windows 95, so it seems to be unnecessary. But I've been unable to move, rename, or delete it. Can you tell me if I need this file? And if not, how I can get rid of it?

ED KNEBEL
Peoria, Illinois

PC MAGAZINE: 386SPART.PAR is the name of the Windows 3.x permanent swap file, which provides the system with virtual memory. Once created, it occupies a series of contiguous clusters of disk space in a fixed location on the disk, allowing Windows 3.x to access the swap file more rapidly. If 386SPART.PAR is damaged or deleted, Windows 3.x displays an alarming message at start-up, and the virtual memory system won't work until the permanent swap file is restored.

The Windows 95 swap file, usually named WIN386.SWP, is quite different. Its size changes as the systems requirements change, and it doesn't have to reside in contiguous clusters on the disk. If Windows 95 doesn't find the swap file at start-up, it simply re-creates it. If you've completely replaced Windows 3.x with Windows 95, the file 386SPART.PAR has no further purpose, right? Wrong!

When you upgrade a Windows 3.x installation to Windows 95, Windows 95 can co-opt the existing 386SPART.PAR and use it as a swap file, rather than creating WIN386.SWP. This swap file can grow bigger if the system requires it, but it can't shrink below the size that was set in Windows 3.x. Here's how to get your system on track.

- Restart the computer in MS-DOS mode;
- edit SYSTEM.INI;
- find the [386Enh] section;
- look for an entry that begins "pagingfile=" (it should point to 386SPART.PAR);
- change this entry to pagingfile=C:\WINDOWS\WIN386.SWP (if your Windows directory is not C:\WINDOWS, use the correct directory);
- delete the files SPART.PAR and 386SPART.PAR using the DELTREE command;
- type WIN to enter Win 95.

Your system should now be using the standard Windows 95 swap file, and 386SPART.PAR should be gone for good. The system can now adjust the swap-file size freely, with no minimum-size constraint.—*Neil J. Rubenking*

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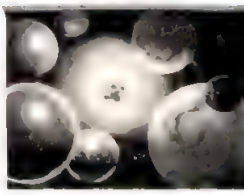
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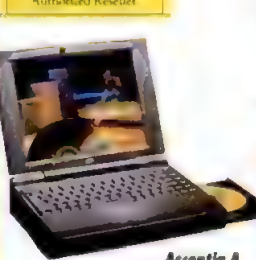
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Cyrix	200MHz	32MB/2.5GB	8X	1999

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Changing the Windows 95 Shortcut Overlay

After I removed my antivirus program, I noticed that the little black arrow with the white background was missing. How do I correct this minor problem?

HAROLD GLUCK
via the Internet

PC MAGAZINE: The little boxed black arrow that appears on a shortcut's icon is called the shortcut overlay icon. There's no reason that removing an antivirus program should eliminate or change the shortcut overlay. You may have accidentally changed the Registry entry that defines this icon, or you may have installed the Tweak UI applet from Microsoft's PowerToys utility collection. If you do have PowerToys installed, use Tweak UI to change the shortcut overlay to the icon of your choice.

If Tweak UI is not installed on your system, you can still change the overlay icon by changing a Registry key. To edit the Registry safely, use the OVERLAY.REG file shown in Figure 1. Edit the last line of the code to match the Windows directory on your sys-

REGEDIT4

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\
Windows\CurrentVersion\explorer\Shell Icons]
"29"="C:\\WINDOWS\\SYSTEM\\SHELL32.DLL,28"
```

FIGURE 1: Edit this file to include the icon you want for your shortcut overlay, then merge it into the Registry by launching it from Explorer.

tem; be sure to retain the doubled backslashes. Then make your own choice of filename and icon number.

Icons numbered 28, 29, and 30 in SHELL32.DLL are clearly intended to function as shortcut overlay icons. You can also select any other icon that has a large enough transparent area to permit the underlying shortcut to show through. Figure 2 shows the same icon with six different overlays—the three standard ones plus COMCTL32.DLL,0 (a bent arrow), MMSYS.CPL,25 (a blue spot), and SYSDM.CPL,5 (a slashed-circle "no" symbol). After you've edited OVERLAY.REG to use the desired icon, simply double-click on it to update the Registry.

When you change the shortcut overlay



FIGURE 2: This composite bitmap shows the same icon with six different shortcut overlays; in reality, the system uses only one overlay at a time.

using Tweak UI, the change takes effect immediately. If you change it using the Registry, you'll need to force Explorer to reread its icons. One way to do that is by changing the color depth in the Display Properties dialog, letting Windows restart, and then changing the color depth back to your preferred value.—Neil J. Rubenking

Restoring Lost Explorer Columns

For some reason, Windows Explorer no longer shows me all the details in the file pane. It shows only the dates of the files—no name, size, or type. Moving the window to the left does not help. And the headings that should indicate Name, Size, and Type columns are missing. I only get one wide header bar that lacks description. How can I fix this?

ALAN JOHNSON
via the Internet

PC MAGAZINE: This situation can occur from overenthusiastically resizing Explorer's column headers. For those who haven't seen the problem, here's how to duplicate it: Drag the left edge of the Modified column so that it entirely covers the Type column. Release the mouse, then drag the Modified column to cover the Size column. Again release the mouse and drag the Modified column to cover the Name column. Your display has been reduced to a column of file date/time stamps!

Fortunately, you can recover the missing columns in almost the same way. Place the mouse at the left edge of the Modified column header and drag the header to the right. Do this twice more. Each time you'll expose one of the missing columns. When all are visible, size them to your satisfaction.

Another solution is to find the place where Explorer "remembers" the column layout and wipe it out. First close Explorer—if it's running—and then launch RegEdit. Navigate to the key HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer. Click on Explorer to select it. In the right-hand pane, you'll see a handful of values, including DirectoryCols. Click on DirectoryCols and press the Delete key. Confirm that you want to delete

this value, then relaunch Explorer. You should now be able to see all of the details columns at their default widths.

—Neil J. Rubenking

WORD PROCESSING

Dates in WordPerfect Macros



I created a macro in WordPerfect for Windows that automatically adds my return address and the date to a document. When I reload documents at a later date, however, the documents show the current date rather than the date the document was created. How can I change the macro so that once the document is stored on disk, I can retrieve it later with the date it was created?

JAMES CANNON
via the Internet

PC MAGAZINE: Although Mr. Cannon didn't include a copy of the macro, I'll bet he's using the DateCode () command to add the date. This is the same date code you'll add if you choose Insert | Date | Date Code or press Ctrl-Shift-D. This code is designed to show the current system date at all times, automatically updating it each time you save or open the file. It can be useful if, for example, you have a form letter that you want to use repeatedly without having to remember to change the date each time you use it.

To revise the macro so that it inserts a date that doesn't change, you need only replace DateCode () with the DateText () command. In WordPerfect for Windows 6.1 or 7.0, choose Tools | Macro | Edit, highlight the macro filename, and choose Edit. Then edit the command so it reads DateText (), choose File | Close, and answer Yes when WordPerfect asks whether to save the changes. The changed macro will insert the date as text rather than as code.

One other issue you might want to consider is the format for the date. If you use the Insert | Date | Date Format command to change the format for any reason, WordPerfect will continue using that format until you either change it to something else or close the program and reload it. To make sure that the macro will always insert the date in the right format, you can add a DateFormat command to the macro.

Note that the only way to add the command in WordPerfect 6.1 is to record it, a technique that will work for Version 7.0 as well. Use the Tools | Macro | Edit command to open the macro for editing. Then place the cursor at the beginning of the DateText () command and click on the Begin Recording To The Current Document button (third from the left on the macro bar). WordPerfect will open a new document in which you can work while WordPerfect records your actions. Choose Insert | Date | Date Format, and either pick one of the predefined formats or

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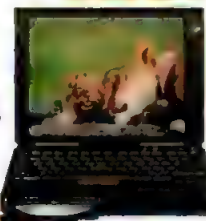


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choose the Custom button to define the format you want. Then choose OK to close the dialog box and click on the Stop Macro Play Or Record button (second from the left on the macro bar). WordPerfect will close the document window and return you to the macro, with the DateFormat command inserted. Choose File | Close to close and save the macro. You can now run the macro at any time, secure in the knowledge that when it enters a date, it will always use the same format.—*M. David Stone*

SPREADSHEETS

Arithmetic and Logical Operations with Labels



I have discovered a design flaw in Lotus 1-2-3 that causes the program to give erroneous results. Suppose you have the following table in A1..B7:

Team	Num
F	68
F	68
F	68
0	68
F	68
0	68
1	68

If you write the formula

```
@DCOUNT(A1..B7,"team",TEAM=
"F"#AND#NUM=68)
```

1-2-3 incorrectly returns 6, because it somehow thinks the 0 entries are really Fs! The same problem shows up if you use @IF to evaluate the cells in column A. For example, the formula

```
@IF(A5="F"#AND#B5=68,"TRUE","FALSE")
```

returns TRUE for all of the rows, because 1-2-3 can't tell the difference between a 0 and an F.

BERNIE FUHRMANN
via the Internet

PC MAGAZINE: This problem has plagued 1-2-3 since its early DOS days. In arithmetic operations, 1-2-3 regards a label cell as equivalent to a blank cell, which is evaluated as a 0. Thus, if you inadvertently perform a math operation on a label, instead of eliciting an error message, you get the result you would get if the cell had a 0 in it. Not ideal, perhaps, but it's what 1-2-3 users and macro programmers have come to expect, so you can understand why Lotus has chosen to preserve this behavior across the ages.

Unfortunately, 1-2-3 (unlike Quattro Pro,

which in many other ways mimics early 1-2-3 behavior) still regards the label as a 0 when you do a logical operation, such as using @IF or @DCOUNT to evaluate the cell. Not only is this not ideal, it's downright hazardous to your health. Fortunately, there are workarounds.

In the case of @DCOUNT (and all the other @D functions), the way to stay out of trouble is to keep the criteria on the worksheet instead of hard-coding them into the function. For example, if you set up a criteria range in, say, J1..K2, like this:

Team	Num
F	68

and then write the @DCOUNT formula like this:

```
@DCOUNT(A1..B7,"team",J1..K2)
```

you get the correct results, even if some of the cells in the "Team" column are 0s. Separating the criteria from the @DCOUNT formula has the added benefit of making the criteria easier to modify.

As for the @IF problem, one way to help 1-2-3 distinguish text from 0s is to add another test. The formula

```
@IF(A5="F"#AND#B5=68#AND#@CELL("type",
A5)="L","TRUE","FALSE")
```

makes sure that A5 is truly a label as well as an "F," thereby avoiding false positives.

—*Craig Stinson*

DATABASES

Input Masks and Exporting from Microsoft Access



Using Access 2.0's wizards, I set up a database to contain some employee information. For employee telephone extensions, I set up an input mask so I wouldn't have to key in the area code and the first three digits, which are the same for all employees. Table View showed the complete phone number for each employee, including the input mask, but when I tried to export the table to an Excel 5.0 file, only the four keyed numbers were exported. I ended up using cut-and-paste to complete the spreadsheet. Is there a way to export the database data exactly as it is shown in Table View to an Excel spreadsheet?

JON MOCHIZUKI
Los Angeles, California

PC MAGAZINE: Yes—with a little work that involves creating a query and a macro, we can export the data exactly as it is currently shown in your Table View. But first we should discuss

why you're having difficulty simply exporting what you currently see in Table View.

Right now, when you enter a telephone number Access supplies the area code and the first three digits of the telephone number thanks to your input mask, and you type in the final four digits. But Access stores only those final four digits in the Employees table, because Access, like many other database products, defaults to storing only the nonmasked portion of masked input.

The reason you might want to store only the nonmasked portion of the data is that it saves disk space. A fully formatted telephone number stored as "(800) 555-1212" occupies 14 characters—40 percent more than if it were stored as "8005551212". The disk-space savings can be significant if you have a large database. Imagine an Employees table for AT&T or GM, for example.

In Access, the second part of the input mask specifies whether Access is supposed to save the mask along with the data. If this part is a 0, both the mask and the information you enter is saved in your table. If it's either blank, as it is in your case, or a 1, Access saves only the data and not the mask. This is the default setting.

When you use the Input Mask Wizard, you are asked whether to save the data with the symbols in the mask or without, as shown in Figure 3. The Input Mask Wizard then places a 0 in the second position of your input mask, or leaves it blank, depending on your choice.

The reason you can't export what you see in Table View is that Access exports only what's actually in the table—in your case, only four digits of each telephone number are stored there. The reason the telephone numbers look complete in Table View is that Access applies the input mask to the stored information before displaying it in Table View.

I'll offer you two solutions: First, I'll show you how to export your current data in the format you want using a query and a macro. This solution assumes you want to continue storing only the final four digits in your table. Next, I'll show you how to change your database so that the entire telephone number is stored instead of just the final four digits. We'll change your input mask so that any future additions include both the mask and the data. Then we'll create an Update query to change your existing telephone numbers to their full-length, 14-digit formats. This second solution is the one I recommend, assuming you don't have the disk storage requirements of AT&T or GM. Having the full telephone number stored in your table avoids any difficulties should one of your employees end up using a different area code or exchange. And if you need to share your data with anyone else, the fully formatted telephone number will be in the table.

For the first solution, we can export your

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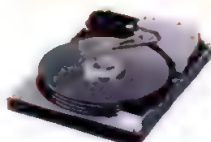


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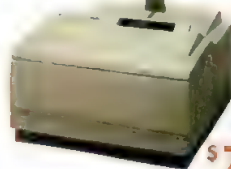
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data in the correct format by creating a query and a macro. The query will retrieve all of the information in your table and format the telephone number the way you want it. The query will then become source material for the macro, which will export the query result to an Excel file.

To create the Query, select the Query tab in the Database window and then choose New. When the New Query dialog appears, choose New Query, then add your Employees table to the query and close the Add Table dialog. Now click and drag each of the fields in the Employees table onto the query grid, so that each appears in a different column on the grid. For example, you might have one column each for Employee ID, Lastname, Firstname, and PhoneNumber. Now click on the PhoneNumber field and edit it so that it appears as follows:

```
Telephone: Format(PhoneNumber,"(123)
123-####")
```

This replaces the PhoneNumber field with an expression that formats the phone numbers the way you want.

Now select the Query menu and choose Run. You should see the Query result showing your Employees table with the telephone numbers correctly formatted. It'll look something like Figure 4. Select the File menu, choose Save Query, enter Employee Query,

plus the dot and extension). Now select the File menu, choose Save, enter Export-Spreadsheet, and click OK to save the macro.

To run the macro, select the Macro menu and choose Run. Access will export your employee information in the correct format. Now you can close the Macro window and run Excel to view your exported data. If you want to continue storing only the final four characters of each telephone number, stop here.

Now for the second solution. To store the mask symbols and the entire telephone number along with your entered data in the future, we'll need to change the Input Mask property of your telephone column. To do so, highlight the table where the telephone numbers are stored, then choose Design. Next, highlight the telephone-number field, then click on the Input Mask property in the lower part of the display. It should currently say something like "!(123) 123-0000;_". To set the second part of the input mask, just add a zero after the first semicolon. The mask should now be "!(123) 123-0000;0;_". Don't forget to save your changes.

This will make certain that any new telephone numbers are stored in 14-digit format, but what about your existing telephone numbers? To convert your 4-digit numbers to 14-digit format, we'll use an Update query. To do so, select the Query tab in the Database window and choose New. When the New Query dialog appears, choose New Query, then add your Employees table to the query and close the Add Table dialog. Next, select the Query menu and choose Update. Then select the View menu and choose SQL. Now replace the contents of the SQL window with the following:

```
UPDATE DISTINCTROW Employees SET
Employees.PhoneNumber = Format
(Employees.PhoneNumber,"(123) 123-
####");
```

Change the table name and column names in the above to match your own, of course. Be sure to include the space after the (123).

Now choose Run. Access will update all of the telephone numbers and change them to include the missing characters. Choose OK when prompted.

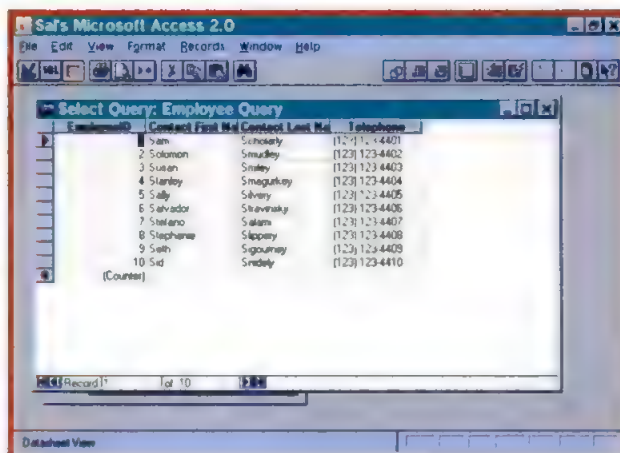


FIGURE 4: You can create a query to output information formatted the way you want. Here the telephone numbers are formatted, even though the table contains only the last four digits.

Normally, you'd save the query at this point, but this time you should just close the Query window and choose No when asked if you want to save it. Once you've run this Update query, running it a second time will only mess things up.

If you created the Employee Query and the ExportSpreadsheet Macro mentioned earlier, remember that they're useful only if you want to continue storing just the last four digits. If you created the query and the macro and also applied solution two, you should delete the Employee Query and the ExportSpreadsheet Macro now. They're no longer necessary.

That's it. Now that your table is updated and your input mask is fixed, you should have no more problems exporting. Just highlight the Employees table, select the File menu, choose Output To, and follow through the prompts.—*Sal Ricciardi*

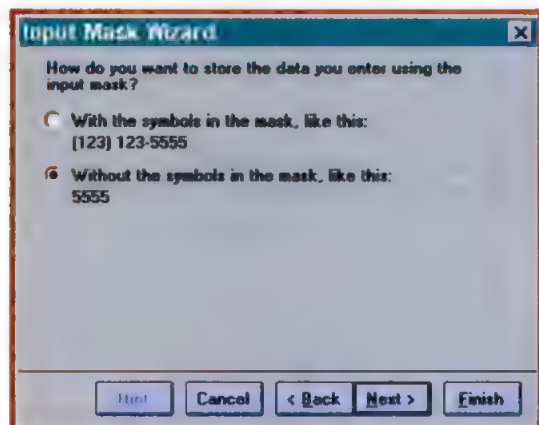


FIGURE 3: When you create an input mask using the Input Mask Wizard, you'll be asked to choose whether to store the data with or without the symbols in the mask.

and then choose OK to save the query.

To create the Export macro, close the Query window and select the Macro tab on the Database window, then choose New. Select TransferSpreadsheet as the macro action. In the Action Arguments section, change Transfer Type to Export; Spreadsheet Type to the type you want (for example, Microsoft Excel 5.0); Table Name to Employee Query; File Name to Employees.xls (or the name of your choice). This is deliberately misspelled, because Access 2.0 limits filenames to eight characters

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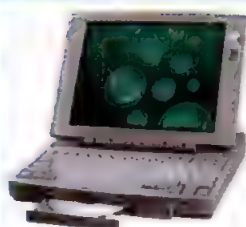
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- 33.6/14.4 Data/Fax Modem

(Monitor sold separately. Some software is preloaded. Software manuals/diskettes not included.)



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NEC Superscript 860 #121450	499 ⁹⁷
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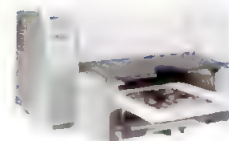
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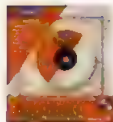
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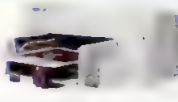
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 512KB L2 Cache
 2.1GB Hard Drive
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 8X EIDE CD-ROM Drive
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 Keyboard, Mouse
 1 Year Warranty, 30 Day Guarantee
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 Keyboard, Mouse
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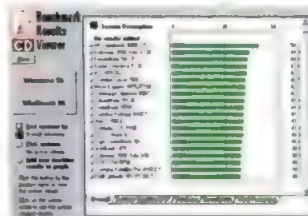
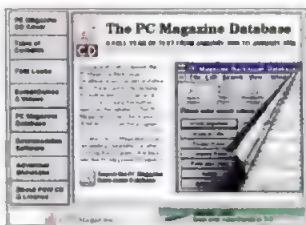
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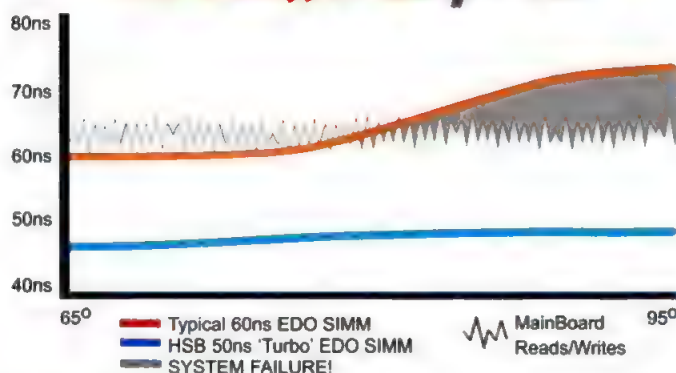
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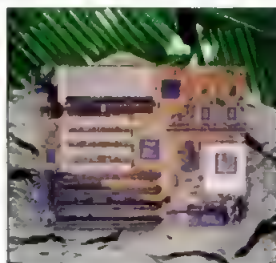
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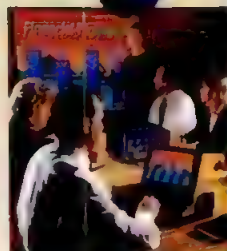
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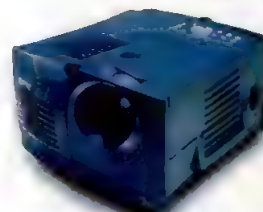
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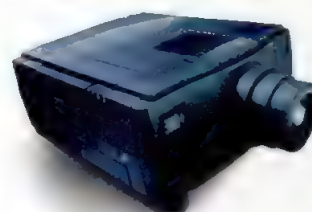
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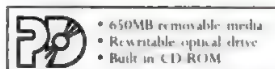
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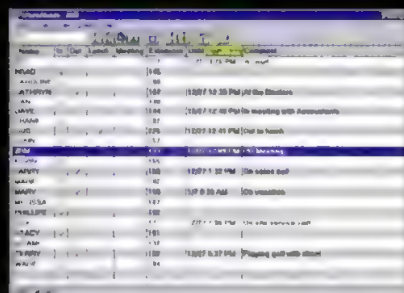
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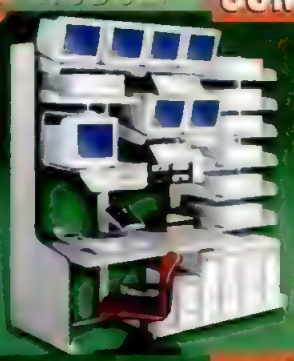
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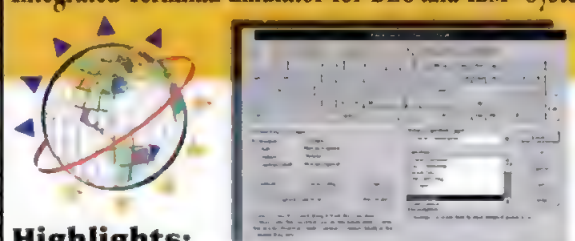
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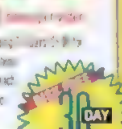
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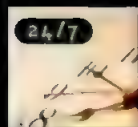
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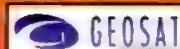
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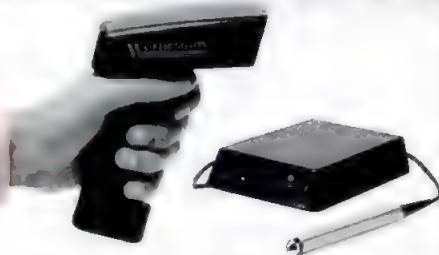
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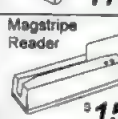
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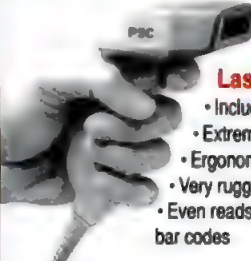
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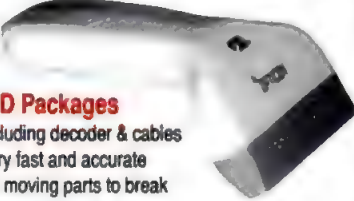


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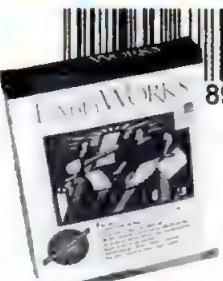
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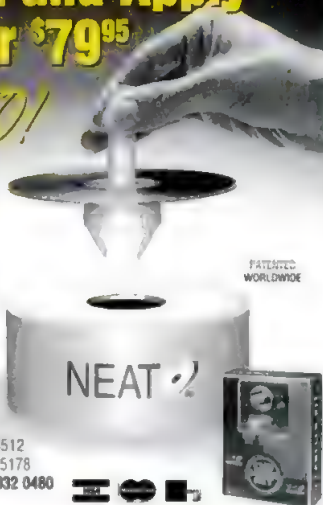
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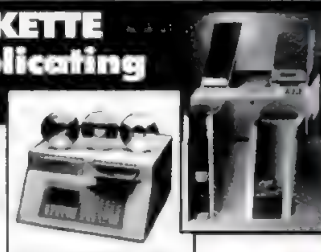
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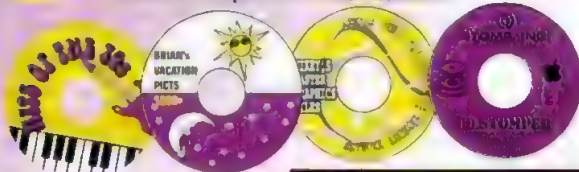
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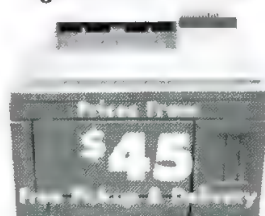
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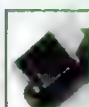
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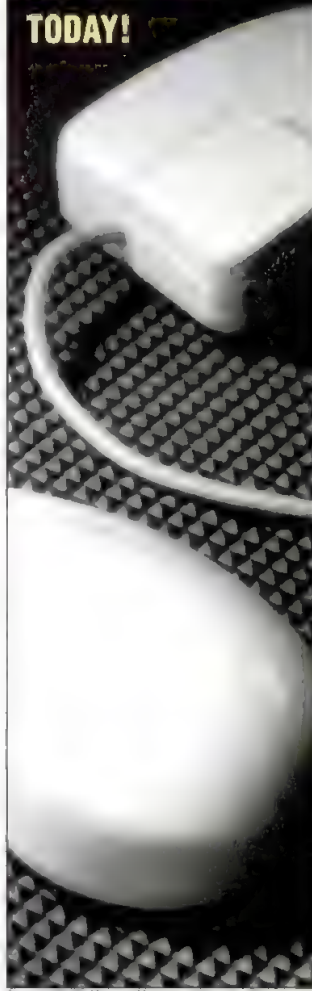
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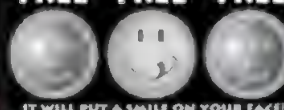
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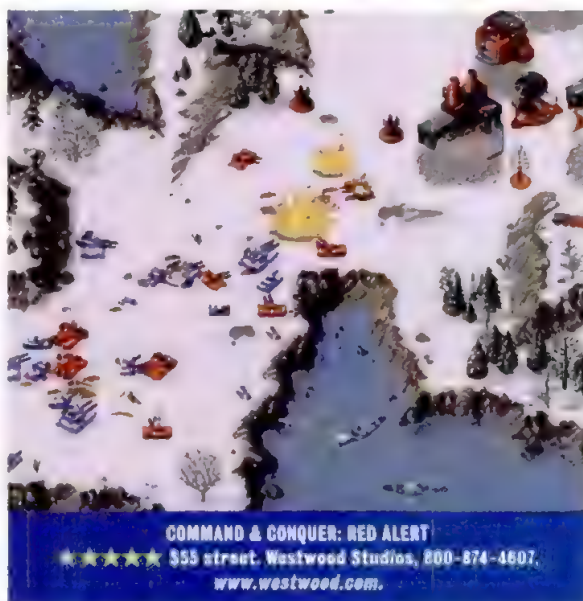
Released almost two years ago, Westwood Studios' Command & Conquer helped launch a wave of real-time strategy games that is still gathering strength. Now, before most of us have even kicked our Command & Conquer habits, Westwood is back with Command & Conquer: Red Alert, a prequel to the original that is more impressive in every way.

Red Alert takes place during the World War II years, only in this game the war never happened: A time traveler has knocked off Hitler before he rose to power—but he's forgotten about Stalin, who with the Soviet Union's vast resources has developed new technologies and built huge armies to ensure that people throughout Europe and Asia end up seeing red.

That's where you come in, assuming control of either the Allies (Britain, France, and Germany) or the Soviets. Allied players must use stealth and cunning to defeat the Red Army, while Soviet players will

best achieve victory through take-no-prisoners methods.

Although the Command & Conquer lineage is unmistakable in Red Alert, this is more than just the same old game with a new story. The first difference you'll notice is the



Super VGA graphics in the Windows 95 version (the DOS version looks much like the original game). The units are a bit smaller in Super VGA, but the graphics are far more detailed.

Red Alert packs several other new features. Better artificial intelligence and multi-player skill levels are big pluses, as are the 30 new unit types (we especially liked the sub-

marines, destroyers, MiGs, and attack dogs).

Finally, Red Alert has even better multiplayer support than Command & Conquer. If you've heard about the real-time craze but have been holding off until you find the best possible example of the genre, your wait is over.—Shane Mooney

Master of Orion II: Battle at Antares

A hugely popular space-based strategy game, Master of Orion was hailed by game players and critics alike, who nonetheless pointed out that it could be even better with a few tweaks: more complex economic models, less repetitive combat scenarios, and multi-player capabilities. With Master of Orion II: Battle at Antares (MOO2), MicroProse Software not only has addressed each of these complaints but has created the strategy game to beat all strategy games.

In MOO2, population growth has created a need for galactic expansion. As emperor



of your species, you start with a home world and decide how your species will expand throughout the universe. You'll have to deal with other galactic civilizations as you move about the cosmos, deciding which to befriend and which to crush underfoot.

In addition to spectacular new Super VGA graphics, MOO2 boasts numerous other improvements over its predecessor. You can choose from 13 different species to play, each with its own strengths and weaknesses, or you can create your own. Star systems now have multiple planets instead of just one. And the combat system is like a game in itself, filled with plenty of ship-to-ship weapons that will satisfy even the most warlike players. Naturally, the one with the most toys in the end wins. But lest that challenge prove too easy, the designers

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After Hours



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threw in the Antarians, a mysterious, powerful alien race that will appear and lay waste to your fleets and colonies from time to time. Thankfully, you can turn this feature off and tailor the difficulty level to make the game enjoyable for players of any skill level.

MOO2's impressive multiplayer support includes head-to-head modem and hot-seat play, along with IPX network and Internet play.

A well-designed, challenging title, *Master of Orion II: Battle at Antares* is a strategy fan's dream.—*SM*

Tomb Raider

Tomb Raider, by Eidos Interactive, grabs your attention from the opening screen and makes you want to keep playing into the wee hours.

The game's main character, Lara Croft, is like a female Indiana Jones—only tougher. As you guide her through Tomb Raider's 15 levels, you'll encounter a bizarre mix of enemies, traps, and other challenges. To complete your journey, which leads you through spectacular 3-D environments including caves and pyramids, you'll have to pick up clues, weapons, and artifacts along the way. But you'll also have to be ready for the unseen creatures that lurk in the shadows.

Unlike most action games, Tomb Raider is played from a third-person perspective. The result is a wider field of vision than you'll find in games like Quake (for example, you can see things that are behind you). Unfortunately, the game's floating viewpoint often hides crucial objects or scenery.

We also did not like the game's lack of joystick, mouse, or game-pad support. Tomb Raider is entirely keyboard-driven, which can make maneuvering difficult at times.

We first tested the game in standard Super VGA mode, then applied a software patch that took advantage of our Orchid Righteous 3D accelerator card, which is based on the 3Dfx chip set. In Super VGA mode, Tomb Raider is more impressive than most 3-D games on the market, but the 3Dfx patch transforms the game into a stunning visual experience—well worth the download from the Eidos Web site, if you have a 3Dfx-based graphics card.

Action fans looking for the latest in 3-D games will love Tomb Raider, as will anyone interested in lots of action with an emphasis on puzzle solving.—*John Delaney*

ToonStruck

Over two years in the making, ToonStruck is an entertaining adventure game filled with animated mayhem.

You are a frustrated animator, Drew Blanc (played on-screen by Christopher Lloyd), who has spent his career drawing "The Fluffy Fluffy Bun Bun Show"—the name alone is enough to send you into insulin shock. Drew's boss has given him an ultimatum: Come up

with more cute characters by morning or begin drawing unemployment. After hours of animator's block, Drew falls asleep and finds himself drawn into Cutopia, the world of "The Fluffy Fluffy Bun Bun Show."

All is not blue skies and butterflies in Cutopia. Count Nefarious, overlord of the Malevolands, is using his Malevolator to turn Cutopia's blissful inhabitants into foul-faced monsters and the countryside into a foreboding wasteland. Cutopia's King Hugh is eager to help you return to the real world in time to meet your deadline but asks one small favor: that you help his engineer build a Cutifier to repair the effects of the Malevolator.

Through the first CD-ROM of this two-CD title, you guide Drew through the beautifully animated environment, solving puzzles. But unlike other adventure games whose

enigmatic puzzles know no bounds, ToonStruck lets you know exactly what needs to be done, though not how to do it.

The second CD takes a twist into the surreal as you try to escape Castle Nefarious. And the bondage-loving sheep and cows that make their appearance



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here should clue you in that although the game is full of cartoons, it is not kiddie material.

But for mature players, ToonStruck is a rare treat. With quality acting, wonderful animation, and excellent game play, ToonStruck should please anyone looking for a different kind of adventure game.—*SM*

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Battlecruiser 3000 AD

Despite more than six years in development, this much-anticipated title is so full of bugs as to be unplayable on most systems. The lack of documentation doesn't help much. \$50 street; Take2 Interactive, 212-941-2988.

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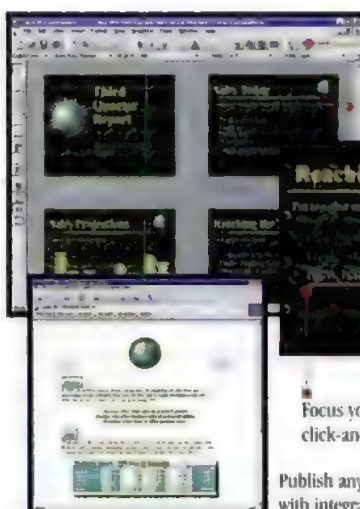


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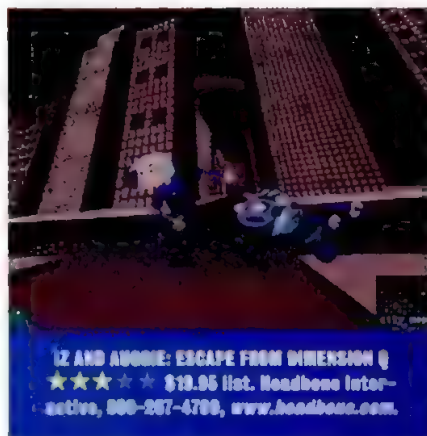
Iz and Auggie: Escape from Dimension Q

Do you know any child who doesn't dream of being a secret agent? Headbone Interactive's *Iz and Auggie: Escape from Dimension Q* allows players to fulfill such fantasies while learning problem-solving and deductive reasoning skills.

Escape from Dimension Q is a bit different from the average adventure game. Iz, the heroine, asks children to solve puzzles that will hold their at-

tention without resorting to blood-and-guts violence. And although each puzzle is integral to completing the game's goals, you can skip an especially trying section without affecting your end results.

The game features lush, inventive animation. And Headbone hasn't neglected the program's content. The story is engrossing and easy to follow. Your objective is simple: Rescue Iz's music from the evil villain, Cosmo LaRue, while navigating through the futuris-



tic *Dimension Q*. You'll work through up to 14 puzzles, depending on how successful you are. The more mistakes you make, the more puzzles you have to solve. If you get stuck, you can turn to the program's Hint-O-Matic assistance.

Puzzles range from piecing

together a mixed-up picture by sliding its pieces around to decoding transmissions from other secret agents, who are missing in the *Dimension*. One task sure to be a favorite is the Chase, where you have to escape from the Qubic Pentameter's force field by finding keys and by avoiding roadblocks and the evil Pentameters.

Headbone Interactive targets the game at children ages 10 and up, but we think its true audience will be a few years younger. The lighthearted characters and whimsical plot may not appeal to some older children. —Karen Bannan

Command the Stars

SSI's latest General game breaks new ground despite a few flaws.

Star General

Strategic Simulations Inc. (SSI) has followed up the huge success of *Panzer General* with more "easy-to-learn but hard-to-master" war games: *Allied General*, *Fantasy General*, and now *Star General*. The latest effort is a good one but suffers from minor flaws that may keep it from reaching the classic status of its predecessors.

In *Star General*, you command your military forces against a number of alien races. The game includes eight two-race scenarios, along with an option to generate your own scenarios with up to eight races competing.

Star General's most intriguing feature is its two-level combat system. Most of the combat takes place in space,

where you pit your fleet against your enemies'. Once you defeat an enemy's fleet, you can take his planets. In ground combat mode, you

must land your troops and then use them to take the enemy's cities. Once the cities fall, the planet is yours.

This addictive blend of combat modes keeps *Star General* from being just a "Panzer General in space," but the game is not without its faults.

First, the whiny, saxophone-heavy background mu-

sic gave us a headache every time we played. Some players may enjoy these tunes, but we turned them off.

Second, the sound effects are not all they could have been, and the graphics are often confusing. For example, it is difficult to tell from the icons for the game's 90-plus ships just how powerful each is. In many cases, small ships (such as the missile boats) are actually larger on the screen than large ones (battleships).

We also found two bugs. One ended the game after a single turn (it has been fixed by a patch that is now available on SSI's Web site), and the other awarded victory in large battles to races that were not participants. SSI assured us that the second bug would also be fixed in an upcoming patch.

While *Star General* is a good strategy game with unique features and very impressive game play, it is not the must-have that other *General* titles were. —Michael E. Ryan



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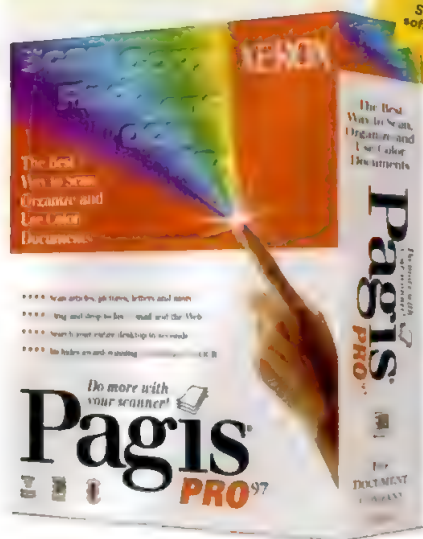
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Coming Up

What's in the Next Issue of *PC Magazine*

15th Anniversary Issue

PC Magazine first hit newsstands in 1982, the year after IBM launched its PC. Not long after that, lots of other companies jumped in from all sides, and a huge and varied industry took off and grabbed our attention. We look back over our coverage of PCs and all their trappings.

Technology on the Way

Thinking about the past 15 years got us thinking about the next 15. Which technologies will be important in the near future? We review current hardware and software products that use up-and-coming technologies that we think will develop quickly and have a major impact on the way you do computing over the next several years.

Looking Far Forward

And what awaits us even farther down the line? We look far forward to imagine what's coming over the horizon—how computing will change the way we work and live. Industry greats join us in this look into the crystal ball.



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NE—Network Edition.

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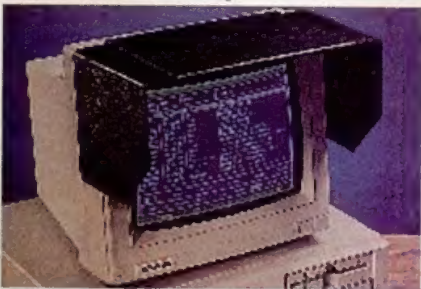
Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

If that's  improved,
then give us
unimproved!
(MISC0 catalog.)

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Contest! The Revenge of The Girl from Nantucket!

March is the month of St. Patrick, so what better time to invite you to submit witty limericks? The best three we receive by March 10 will each win \$50 plus a much-coveted *PC Magazine* T-shirt. Your topic: the Internet. If you're unsure of how a limerick works, just follow this example:

*I surfed till I found a cool site.
"Load Shockwave," it said, "to excite!"
But when I installed it,
My PC blackballed it.
I simmered with rage half the night.*

Overheard

"You can also join us online at www.msnbc.com. You know, I'm always afraid I'm going to say too many W's."—NBC NEWS ANCHORMAN TOM BROKAW


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So When Exactly Do You Work on Your Web Site?

"Thursday nights I tape 'Diagnosis Murder' and watch 'Friends' and 'The Single Guy.' Then I tape 'Moloney' AND I tape 'Seinfeld' while I watch 'New York Undercover.' That will change, though, since soon 'Babylon 5' and 'Deep Space Nine' will start, and also 'Murder One.' I will have some big decisions to make."

—SUZANNE LANOUE'S HOME PAGE (www.pe.net/~suzanne/tvpage.htm)



 Of all the
bewildering
bargains, this
beats the
bunch!
(Computer
Clearance
Warehouse ad.)

 Zelco's Computer
BudVase may brighten
your day, but to us it
looks like some kind of
botanical-radiation
experiment.



"I'll bet that fellow Gates had something to do with this."

If your entry is used, we'll send you \$50 and a *PC Magazine* T-shirt. Send your entries to Abort, Retry, Fail?, *PC Magazine*, One Park Ave., New York, NY 10016-5802 or, via e-mail (text items only), to don_willmott@zd.com. Winners this issue: Carol Bruce, David Szutu.

CAN YOU REALLY AFFORD TO BUY THE #2 NOTEBOOK?

ANNUAL GUIDE TO COMPUTERS				
Laptops				
TRAVELING COMPANIONS				
Some Popular Pentium Notebooks				
RANKING	MODEL/PRICE	MONITOR/SCREEN	CONFIGURATION	COMMENTS
3.1	DELL COMPUTER \$2999	Latitude LM P133ST, 12-in. TFT display, (133 Mhz)	6.8 lb 16MB RAM, 810MB disk, 6X CD-ROM	Great
2.8	IBM PC CO. \$6999	ThinkPad 760ED 1, 2-in. TFT display (133 Mhz)	1.7GB disk, 4X	
2.8	WINBOOK COMPUTER \$3999	WinBook 11.3" (133 Mhz)		
2.7	COMPAQ COMPUTER \$6398			
2.7	HEWLETT- PACKARD \$6120			

— *Business Week*,
November 4, 1996 —

What's wrong with this picture? The notebook that gives you the most performance, usability and features costs half the price of notebooks that give you less. (Notebooks, by the way, that you probably thought gave you more.) And remember, you have this information on the very best authority. *Business Week*, the business publication, in their Second Annual Computer Buying Guide cited the Dell Latitude LM P133ST as "the top ranked machine in the tests" and the notebook they'd most like to travel with. So if you're shopping for a notebook, buy the best. After all, you can afford it.



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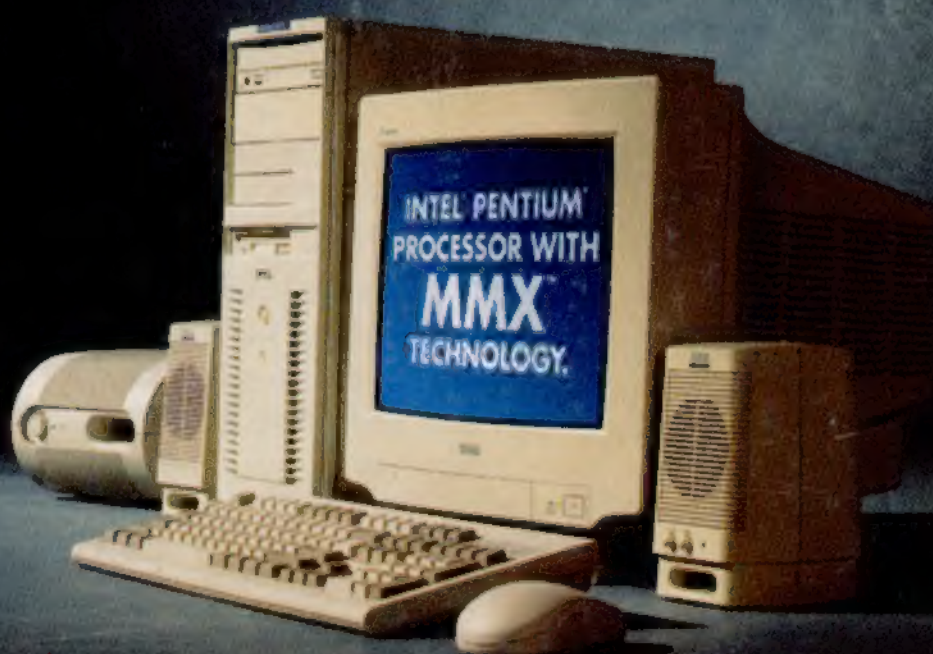
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- ★ PC COMPUTING MVP WORKHORSE DESKTOP - XPS P200s
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- ★ PC WORLD BUDGET DESKTOP BEST BUY - P100i
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- ★ 5-time PC WORLD BUDGET DESKTOP BEST BUY - XPS P120c
- ★ PC COMPUTING 4 STAR AWARD - P100i
- ★ PC WORLD POWER DESKTOP BEST BUY - XPS P90c
- ★ 3-time WINDOWS MAGAZINE RECOMMENDED LIST - XPS P166c
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